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Short haul city travel is truly environmentally sustainable

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Abstract
With rising interest in and concern about climate change and environmental sustainability, and the significance of the tourism industry worldwide, the impact of tourism-related activities and behaviors on the environment has become a key area of research. In particular, transport related to tourism has come under scrutiny for its contribution to the ecological footprint of tourism of a destination, mostly accounted for by the dominance of air travel. This study contributes to research in this area by identifying the types of travel situations in which tourists make environmentally friendly choices about travel modes and, consequently, which types of tourism destinations should seek to develop and promote in order to minimize the environmental impact of the tourist sector on both an individual destination and global scale.

Keywords
truly, haul, environmentally, sustainable, tourism, management, city, travel, short

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Abstract

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Keywords: ecological footprint, environmentally friendly, sustainability, tourism transport

1. Introduction

Sustainable tourism has been on the research and industry agenda for many years. Not only have there been a number of studies conducted into the potential impacts of climate change on the tourism industry (Agnew & Viner, 2001; Amelung, Nicholls & Viner, 2007; Amelung & Viner, 2006; Belle & Bramwell, 2005; Bigano, Hamilton & Tol, 2006; Gossling, Peeters & Scot, 2008; Lise & Tol, 2002; Maddison, 2001; Moen & Fredman, 2007; Perry, 2006; Scott et al, 2006; Steiger & Mayer, 2008; Wall, 1998; Yeoman & McMahon-Beattie, 2006), but also the potential impacts of tourism on climate change (Becken, 2002b; Becken, Simmons & Frampton 2003a and b; Ceron & Dubois, 2005; Dubois & Ceron, 2005 and 2006; Gossling, 2000 and 2002; Hoyer, 2000 and 2001; Patterson, Bastianoni & Simpson, 2006). Taking responsibility for reducing the negative environmental impact of tourism has become more urgent then ever. Tourism destinations must also now look beyond their own borders to reduce negative environmental impact because climate change: (1) is a global phenomenon, (2) has negative effects visible around the globe, and (3) is caused by a cumulative effect of behaviors with negative environmental consequences.

Tourism is most environmentally sustainable if it causes the smallest possible global ecological footprint. The ecological footprint thus cannot be measured at the destination level only, it has to be assessed on a larger scale and thus account for negative environmental impacts arising from touristic activity anywhere on the planet. For example, if a European tourist spends a week in Australia, not only their footprint in Australia matters, but also the negative environmental impact of their flight to Australia.

The concept of the ecological footprint was first introduced by Wackernagel and Rees (1996). The size of the ecological footprint, as it relates to tourism, depends on several factors grouped into four broad categories: transport, accommodation, activities and food consumption (Gossling et al., 2002). Previous studies have shown that, in terms of the relative contribution of these factors to the total environmental footprint, the mode of transport chosen to reach a destination is the largest contributor to environmental damage, accounting for between 59% and 97% of the environmental footprint of a tourist (see Section 2 for details). Consequently, tourist researchers investigating the ecological footprint of tourism generally agree that environmental sustainability cannot be seen as merely a local concept, but is a global concept which can be expressed in terms of aggregated environmental impact or environmental footprint on a global level.

So far, tourism researchers and industry have made few practical recommendations about how truly environmentally sustainable tourism can be promoted and strengthened. The literature review in Section 2 and 3 identifies some recommendations specific to the sustainability of tourism transport. Typically, in the broader literature, recommendations are classifiable into two streams – supply side or demand side. Throughout this manuscript we use the terminology introduced by Dolnicar (2006) for supply- and demand-side measures, where supply-side factors are defined as instances “where the industry’s goodwill to comply with sustainable management practices is relied upon or regulations are put in place to force industry to comply with nature-conserving practices” and demand-side factors are based on the “concept of self-selection (demand-sided action taken by the tourists) or market segmentation (demand-sided action taken by management)”.

According to Frey (1995) and Laesser (1995), *supply side* measures may include market regulation (for example, parking fees, road pricing, emission pricing, and so on), subsidies (for public transport and so on), policing measures (blocking times, speed limits, and so on), technical measures (technical obligations for emissions, traffic planning, and so on), moral persuasion (educational campaigns, information dissemination, and so on), and others.

The supply-side stream of research assumes that (1) only behavior at the destination matters, and so the mode of transport chosen to get there is not of environmental concern, and (2) that tourists will change their behavior in response to interventions at the destination.

The second stream of research — mostly published under the keyword "ecotourism" — takes a demand-side approach. Ecotourism is not actually defined as being environmentally friendly. Rather, the key features of ecotourism are that ecotourists want to learn about the environment, spend their vacation at a natural attraction (rather than a constructed one) and wish to experience nature. Ecotourists have been profiled frequently in the past (Ballantine & Eagles, 1994; Blamey & Braithwaite, 1997; Diamantis, 1998; Fairweather, Maslin & Simmons, 2005; Hvengaard & Dearden, 1998; Juric, Cornwell & Mather, 2002; Kerstetter, Hou & Lin, 2004; Meric & Hunt, 1998; Uysal et al., 1994; Weaver & Lawton, 2002; Wight, 1996a and b; Wurzinger & Johansson, 2006). Most profiles indicate that ecotourists are concerned about the environment and try to conserve nature. An implicit assumption exists that ecotourists are environmentally friendly — one that was recently challenged by Dolnicar, Crouch and Long (2008) who highlight that pristine natural areas may be more sensitive to tourism than urban destinations. Regardless, the implicit assumptions of ecotourism include: (1) only behavior at the destination matters — tourists visit a local natural area at the destination and are motivated to conserve and protect it, and (2) tourists interested in experiencing and learning about nature leave a small environmental footprint. More recently, a small number of studies have focused on demand-side alternatives to increase environmental sustainability at the destination without focussing solely on ecotourists (Ataljevic & Doorne, 2000; Dolnicar 2004; Dolnicar & Leisch, 2008a and b; Crouch, Devinney, Dolnicar, Huybers, Louviere, & Oppewal 2005; Fairweather, Maslin, & Simmons 2005). Although not limited to nature-based tourism, these studies also lack a global perspective in conceptualizing environmentally sustainable tourism, and are also guided by the assumption that local behavior is of primary interest.

We believe that neither the current supply-side nor demand-side literature accounts for how destinations could truly improve environmental sustainability of the tourism activity they generate. Consequently, the present study contributes to environmentally sustainable tourism research by: (1) identifying which types of travel situations are associated with environmentally sustainable travel mode choice, and (2) identifying which kinds of tourism destinations should develop and promote in order to minimize their negative global environmental impact.

2. The contribution of transport to the environmental footprint of tourists

Calculation of a specific ecological footprint can be done using either a "top down" or "bottom up" approach (Hunter & Shaw, 2007). The "top down" traditional compound approach uses national energy and trade flow data to estimate the footprint per capita, while the "bottom up" component based approach sums available life cycle data for a region across the individual footprint components (Hunter & Shaw, 2007). In the tourism context secondary data from sources such as visitor surveys, tourist boards, mileage calculators such as Milemarker (Peeters & Schouten, 2006), electricity boards and population censuses are used in the calculations. The ecological footprint is expressed in terms of global hectares (gha), which are weighted ecological surfaces as opposed to actual surface areas of regular hectares (Patterson, Niccolucci & Bastianoni, 2007). However, previous studies in the tourism context often do not provide gha figures or refer to different measurements (such as m^2 or ha per capita per year).

Several studies specifically operationalize the ecological footprint concept within the tourism context and estimate or discuss the contribution of transport to ecological footprint. For example, Cole and Sinclair (2002) measured the ecological footprint of a Himalayan Tourist Centre, and compared the ecological footprint before the town became a major tourist attraction with the current ecological footprint. The ecological footprint calculations used information from several secondary sources, such as the United Nations, Director of Census Operations and FAOSTAT Agricultural Database. While this study was not specifically designed to identify the footprint of tourist activities, the authors noted that the provision of amenities and services for tourists increased the ecological footprint, and the activities they participated in also depleted natural resources. Cole and Sinclair particularly note the startling increase in vehicles primarily serving tourists — from 91 buses in 1971 to 75 buses, 700 taxis and 350 auto-rickshaws in 1995. The authors' calculations show a fivefold increase in the ecological footprint of the town and 80% of this increase could be attributed to tourism.

Gossling et al. (2002) operationalized the ecological footprint concept for tourism in the Seychelles. The transport component in their study included all travel related to the vacation (to and from airport, return flights, and all travel at the destination). They note that the ecological footprint should consider both the energy use and infrastructure requirements related to this transport. Gossling et al. (2002) calculated energy use associated with travel to the destination using data on international flights arriving in the Seychelles, and transport around the destination included rented cars, taxis, buses/coaches, public transport, helicopters, aircraft, and boats. The key findings related to the areas of tourist infrastructure and fossil energy land. Tourist infrastructure, also referred to as the built up land footprint, relates to spaces that are unable to be used for biological productivity because they are covered with roads, buildings, amusements parks, etc (Gossling et al., 2002). Fossil energy land refers to how large an area of newly planted forest would need to be set aside to offset the carbon dioxide released by human activities (Gossling et al., 2002). The authors' findings show that the land directly used for tourist infrastructure is surprisingly small (0.0105ha per capita per year), which they suggest is because the infrastructure is used by a large number of tourists per year, and so the per capita use is small. In comparison, they found the ecological footprint of fossil energy land to be substantial (1.73 ha per capita per year), and about 97% of this resulted from air travel. Gossling et al. did not provide comparative footprint details for travel to the destination and travel around the destination, instead combining them into an overall transport component.

Peeters and Schouten (2006) investigated the ecological footprint associated with inbound tourism in Amsterdam using data collected through the Amsterdam Leisure Consultancy 2001 visitor survey. The findings show that air transport accounted for 87% of the ecological footprint of transport to the destination, followed by private car (5%) and train (3%). They conclude that the average ecological footprint for travel to the destination per tourist per visit day is 5.4 times greater than the daily "fair earth share" (the amount of bio-productive land available for each inhabitant of the Earth). Looking at the ecological footprint of inbound tourism to Amsterdam overall, the weighted travel to Amsterdam accounted for 70.1% of the total ecological footprint, accommodation 21.3%, leisure activities 8.1% and local transport 0.5%. A possible reason for the low contribution of local transport could be that the ecological footprint of transport was calculated using "passenger kilometres" and it can be assumed that local transport involves less kilometres travelled than transport from origin to destination. Peeters and Schouten conclude that the main variables determining the ecological footprint related to tourism transport were distance travelled, transport mode used, and length of stay. They recommend that length of stay be the focus of sustainability strategies, because longer trips involve less time pressure on transport, and so are more environmentally friendly. Peeters and Schouten also suggested targeting marketing efforts towards markets closer to the destination.

Hunter and Shaw (2007) present a methodology for estimating ecological footprint values for international tourism activities involving air travel, concluding that 84% of the average net ecological footprint of UK tourists to New Zealand can be accounted for by air transport to the destination. The authors also note the value of the ecological footprint calculation in assessing the ecological implications of changes in the number of tourists from certain markets. Based on Becken's (2002b) study of energy use associated with international air travel to New Zealand in 1999, Hunter and Shaw demonstrate that a 10% increase in tourists from the UK to New Zealand would generate an additional footprint of around 62 500 gha. In comparison, a 10% increase in Australian visitors to New Zealand would result in an additional footprint of only 34 500 gha. One might expect the additional footprint of Australian visitors to be less than half that of UK visitors given the dramatic decrease in air distance to be travelled. Hunter and Shaw calculate the additional footprint based on gross *per tourist* ecological footprint, and so the apparent discrepancy occurs because there are considerably more Australian visitors to New Zealand than UK visitors (521 912 opposed to 167 202 in 1999).

A considerable amount of ecological footprint research has been done in Italy. In the tourism context Patterson, Niccolucci and Bastianoni (2007) applied the ecological footprint concept to Val di Merse, Italy. Similarly to the study by Peeters and Schouten, they investigated arrival transport and local transport separately. The ecological footprint for local transport — including private and rental cars — accounted for only 4% of the total ecological footprint for tourists (5.47 gha/year), which was only slightly higher than that associated with local transport of residents (5.28 gha/year). Arrival transport included car, train, coach and air and accounted for 86% of the total ecological footprint of tourists to Val di Merse.

Patterson, Niccolucci and Marchettini (2008) use data from Patterson et al. (2007) and Bagliani, Galli, Niccolucci and Marchettini (2008) in a study of the Siena region of Italy. The authors provide a model incorporating the gap between observed and desired levels of ecological footprint for a destination, suggesting that, by addressing this gap, strategies can be formulated to increase/decrease visitation in the future. While they did not calculate an ecological footprint for the region (instead using data from the two studies mentioned above), Patterson et al. (2008) conclude that the ecological footprint methodology provides valuable input into a feedback process helping to determine the magnitude of tourism interventions necessary to overcome the gap between observed and desired footprint of a destination.

Peng and Guihua (2007) investigated the ecological footprint of tourism-related products in Shangri-La, Yunnan Province, China. The authors compared the ecological footprint of a visitor participating in an eight-day tour to that of a local resident, and concluded that the tourist's ecological footprint was 8.2 times greater than a local's. The transport component accounted for 82% of the total ecological footprint of tourists, and air travel alone accounted for just under 60% of the total ecological footprint.

Researchers generally agree that transportation accounts for the majority of the environmental footprint of a tourist, with figures ranging from 70% to 90%. Breaking this down further, most of this impact can be accounted for by travel to a destination, with figures ranging from a 59% to 97% contribution to transport's overall impact. Only two studies (Peeters & Schouten, 2006 and Patterson et al., 2007) identified the contribution of local transport around the destination to tourism transport's ecological footprint, with figures of 0.5% and 4% respectively.

Except for highlighting the role of air travel to a destination, the above studies do not examine the individual contribution of various travel modes. Becken (2002a) acknowledges that country specific factors need to be taken into account when assessing travel modes, but previous studies can give an indication of which modes would be classified as more environmentally friendly in that they have lower energy consumption or CO_2 emissions.

Becken's (2002a) study of tourism and transport in New Zealand revealed that ferries and domestic air were the most energy intensive modes. Campervans, trains, private/rental cars and tour coaches were classified as having medium energy intensities. The lowest intensities per passenger kilometre were found in the use of scheduled coaches, motorcycles, shuttle buses and backpacker buses. Becken's (2002a) calculation of intensity is strongly dependent on vehicle occupancy, thus lending itself to classifying a fully booked backpacker bus as most efficient.

Outside the context of tourism, other studies clearly identify car and air travel as being the most energy or emissions intense. Scholl, Schipper and Kiang (1996) conducted a comparative analysis of changes in energy use and CO_2 emissions from passenger transport in nine OECD countries between 1973 and 1992. Their comparison found that, despite improvements in CO_2 intensity over the time period, in all nine countries auto and air transport both had higher intensities than buses and rail. In six of the nine countries rail was the least CO_2 intensive mode, buses being the least intensive in the other three. Zachariadis and Kouvaritakis (2003) studied the ten countries of Central and Eastern Europe acquiring "accession country" status to the European Union and found that in 2000 the share of energy consumption from transport was approximately 52% cars, 28% aviation, 10% bus, 6% rail and 4% trucks and inland navigation. A projection to 2030 sees little change in these shares. Brand and Boardman (2008) investigated annual greenhouse gas emissions from personal travel in the UK. Their findings suggest that air travel accounts for 70.2% of average annual emissions per person, 25.5% accounted for by car travel, national rail 1.9%, bus and coach 1.2%, ferry 0.5% and both taxi and motorcycle 0.3% each.

These findings suggest that, in relation to personal travel, the air and auto modes are most environmentally unfriendly, while trains and buses would be considered as more environmentally friendly or sustainable modes of transport.

3. Factors determining the choice of means of transport to the destination

Considerable research exists investigating which factors influence tourists' choice of transport. In light of the findings from previous studies which highlight the significant contribution of travel to a destination we limit our review to studies that investigate transport choice *to* the destination, as opposed to transport choices *at* the destination. Van Middlekoop, Borgers, and Timmermans (2003) applied a choice heuristic model to travel modes among Dutch tourists. They conclude that choice of transport mode depends on the distance to the destination, the presence of children and type of accommodation used. The vast majority (91%) of domestic vacations were taken using a car — even if households did not own a car. Although air travel increased in importance for international vacations, 56% of respondents still chose the car as their mode of transport for international vacations, mainly because a large share of international travel is to neighbouring countries. A similar pattern can also be observed in Germany or Switzerland (Bieger and Laesser, 2005). Van Middlekoop et al. (2003) also found evidence of repetitive choice behavior: the likelihood of choosing transport modes other than the car increased if alternative modes had been used during previous vacations.

Anable and Gatersleben (2004) measured respondent perceptions of their preferred transport mode. The car was the dominant transport mode for day trips, and car users rated the car as performing the best in terms of flexibility and convenience, as well as freedom and control. They considered the car as outperforming other transport modes on all variables, except for the "no stress" variable. Cyclists also had very positive perceptions of their own mode in relation to both affective and instrumental variables. Respondents using public transport as their mode of choice for day trips perceived it as performing worse than all other modes.

Bohler et al. (2006) investigated German citizens' holiday travel behavior, finding that car travel was dominant in the segments of local, mid- and long-distance travellers (81%, 57% and 28% respectively). Air travel was used by 64% of long haul travellers and 26% of mid distance travellers. Public transport (both local and long distance) was used by 18% of local travellers, 17% of mid-distance travellers and 8% of long-haul travellers. While some association was found with socio-demographic variables, high ecological awareness was not connected with avoidance of overseas travel. This is illustrated by nearly 40% of long-haul travellers saying they considered saving the environment very important, yet they tended to mostly use air travel. Bohler et al. highlight a particular strategy for improving the sustainability of tourism transport, notable because their study found private car use to be dominant among all three levels of travel: in recent years, several European destinations have developed marketing strategies specifically for car-free holiday travel.

Dallen (2007) looked at tourist and leisure passenger behavior and attitudes regarding the St. Ives Bay Railway Line in Cornwall, UK. Congestion of nearby roads was cited as having a strong influence on the decision to use the train for 54% of respondents, and a moderate influence for a further 18%. When non-users were asked why they did not use the train service, 60% indicated they were aware of the service but decided against using it. Some specifically stated reasons for their preference for private transport (flexibility, convenience, having lots of luggage), and others gave reasons why they did not like the train (cost, inadequate facilities). The key attitudinal differences between users and non-users were the perception that short-distance rail travel was good value for money and that train services were unreliable. Overall, Dallen concludes there were only subtle differences between users and non-users of the train line, and suggests that a very fine balance exists between mode choice decisions amongst the majority of visitors to St Ives.

Kelly, Haider, and Williams (2007) used a discrete choice experiment though a web-based survey to estimate choice behavior among tourists given different transportation scenarios. Respondents were given four transport mode options for a hypothetical trip between

Whistler and Vancouver: private car, rental car, express bus, or train. Each mode was described in terms of travel time, frequency of service, cost and departure and arrival points. The scenarios were then altered to be either pro private transport, pro bus or pro train. First, the authors compared private and public transportation, and found that the likelihood of choosing public transport decreased as travel time increased. This effect was more significant among day visitors than overnight visitors. As destination parking fees increased, so did the likelihood of respondents choosing public transport; however, this was only statistically significant for overnight visitors. The likelihood of choosing private or rental car transport increased as fuel costs decreased, which was again only statistically significant for overnight visitors. Changing rental car fees did not affect choice between private or public modes. Overall, overnight visitors and day visitors with large household incomes were more likely to choose private transport options, while socio-demographics, trip characteristics and destination motivations did not have a statistically significant impact on choice. Second, Kelly et al. compared bus and train, and their findings indicate that for both overnight and day visitors, decreased travel time was a significant factor in mode choice, with day visitors being more sensitive. Similarly, as transit fares decreased, the likelihood of choosing bus or train increased, particularly for day visitors. Increased frequency of service was positively related to the likelihood of respondents choosing to take the bus (especially for overnight visitors), but did not have a significant impact on choosing the train. Interestingly, convenient location of arrival and departure points did not produce a significant impact on either the bus or train choice. The authors conclude that to induce shifts from private to public modes of transport, bus and train management strategies should focus on travel time and fare levels through dedicated bus lanes, high-speed train options, more frequent services and also parking fees within the destination area.

From these studies, factors that emerge as influencing choice of transport mode include distance travelled, presence of children and accommodation type (Van Middlekoop et al. 2003); importance of affective and instrumental variables such as freedom, control, flexibility, cost, and convenience (Anable & Gatersleben 2005); congestion of nearby roads, flexibility, convenience, cost and adequacy of facilities on public transport (Dallen 2007) and travel time, parking fees, transit costs, fuel costs, and frequency of services (Kelly et al. 2007). This list is not comprehensive, as it does not include potential other factors such as culture, attractiveness of destination, island location, etc. We also do not distinguish between localised factors, which the tourist may not have any knowledge about, and more generalised factors related to the choice of transport mode.

4. Study aims and contribution to knowledge

This study aims to:

(1) identify types of travel situations associated with environmentally sustainable travel mode choice, and from these theoretical and empirical insights,

(2) identify which kinds of tourism destinations should develop and promote in order to minimize their negative global environmental impact.

In investigating these two questions we extend knowledge in the area of sustainable travel mode choice for travel to the destination. Our work differs from previous studies because it: (1) recognizes that travel mode choice is only really possible for destinations where all travel mode options are realistic, (2) recognises that some people may not actually have all travel options available because they do not own a car, (3) uses actual behavioral information based on ex-post-reporting of respondents for each trip they undertook, and (4) includes an extensive range of personal and travel-related behavioral characteristics of tourists. This allows very specific insights to be derived from the prediction of travel mode choice in terms of how a globally sustainable tourism product could be better developed, in turn enabling more specific practical recommendations to be made.

5. Methodology

5.1 Survey administration

The data set was collected in 2004 from a representative sample of residents of Switzerland, and was executed by GfK, one of Europe's leading market research institutes, commissioned and funded by the Institute for Public Services and Tourism of the University of St. Gallen. A representative panel of 3050 households was approached to participate in the research. The final sample consisted of information from approximately 11 245 trips taken during the survey year.

Only a subset of 8588 trips was used for the present study, because: (1) tourists who do not own cars will naturally choose alternative travel modes, and are therefore more likely to use the train, and (2) tourists who travel to destinations that can only be reached by air do not actually have the option of a full transport mode choice set. Consequently, the sample was reduced by only including trips taken by Swiss residents to Switzerland and its neighboring countries which can easily be reached by the full set of available travel modes (including direct and indirect train links), and by excluding respondents who do not have access to a car. This selection ensures that all respondents are actually in the position to make an informed decision about the travel mode independent of the kind of vacation they have chosen to undertake.

The final number of usable trips was further reduced because “only” 4471 (52% of trips) included full information on all dependent and independent variables required for data analysis.

5.2 Questionnaire

Participants were required to provide responses over a one-year period, completing a “trip” questionnaire for each leisure trip undertaken. An additional “person” questionnaire was completed at the end of the year, gathering demographic and psychographic information on the respondents.

Information collected about the trips included variables such as the choice of destination(s), number of previous trips to the destination, number of travel companions from the household and from outside the household, duration of trip, type of trip organization (that is, package versus non-package) and levels of expenditures. Personal information collected at the end of the survey year included socio-demographic information on the respondent, such as gender, age, education, and profession. For a complete overview of the variables and the underlying constructs (as well as references) refer to Bieger and Laesser (2005).

5.3 Data analysis

In order to achieve research aim #1 (identifying which types of travel situations are associated with environmentally sustainable travel mode choice), trips were grouped into two categories:

Group 1 (SUST) included all trips where the train was the major means of transport. A means of transport was classified as the major means if it was used for the majority of time and distance to travel to and back from the destination. For example, a taxi ride to the train station would not be classified as the major means of transportation. Sixteen percent of cases (1378 trips) fell into this category.

Group 2 (NONSUST) included all trips where all other means of transport (excluding trains) were used, such as car, plane, motorbike, caravan, and so on. Eighty-four percent of cases (7210 trips) fell into this category.

Table 1 displays the share of transport modes among the respondents, calculated using responses to the question “What was the MAJOR means of transport used to travel to and from your destination?”

--- Insert Table 1 here ---

One way of understanding which trip characteristics are associated with environmentally sustainable travel mode choice is to try to predict travel mode choice using a range of trip characteristics. Given that the dependent variable to be predicted is binary (Group 1 was assigned the internal value of 1, whereas the control group was assigned the value of 0), a binary logistic regression is the method of choice. Forward stepwise analysis was used to select the independent variables that contributed most to predicting group membership. The following independent variables were included in the final model: (1) number of previous trips to destination (metric), (2) number of travel companions from household (metric), (3) number of children in travel party (metric), (4) duration of trip in terms of overnights (metric), (5) type of trip (19 items; four-point approval scale), (6) vacation activities (71 items; metric; ratio of days activity was pursued in relation to overall duration of trip), and (7) means of transportation within the destination (12 items; dichotomous scale; we computed polynomial contrasts with regard to those variables). These variables cover factors identified in previous literature as affecting travel mode choice to the destination.

6. Results

The data fits the model satisfactorily. The model converged after eight iterations, after parameter estimates changed by less than .001. Overall, 86% of all cases could be correctly classified. However, the classification ratio was clearly higher with regard to the NONSUST group (96%) than with regard to the SUST group (31%), mainly due to the high share of cases not including the train as a major means of transport in the first place. Nevertheless, the Hosmer Lemeshaw test revealed the above classifications to be significant (chi square = 21.652; $p < .005$). However, both Cox and Snell as well as Nagelkerke R square turned out to be rather low, with values of .218 and .318 respectively. Consequently, the predictive power of the model is limited.

The results (see Table 2) reveal that the likelihood for taking the train within a given travel situation decreased with larger travel groups. However, and in contrast, the presence of children within the travel group slightly increased the chances of taking the train, although this effect - in relation to the one with regard to group size - is very small. This signifies that small groups which include children would take the train whereas larger groups would prefer other means of transportation. Neither the duration of trip nor the familiarity with the destination contributed to a significant change with regard to the odds of either taking the train or another means of transport. Overall, the odds for the use of trains as opposed to other means of transport increased in cases where (1) the trip was denominated as “city trip,” “study tour,” “language trip” (mostly to cities), or “visit friends and relatives” and (2) the traveller pursued the following selection of activities: “walking/hiking”, “bicycling and mountain biking”, “ball games” and “horse riding” as well as “excursions” (by tourist types of transport such as mountain cableways and boats), “visit museum”, “go to/participate at events”, “get to know other people”, “go to lectures and exhibitions” and “spend time basking in the sun.” Finally, the availability and use of several means of transportation *within* the destination increases the odds of taking the train *to* the destination in the first place. Those means are trains, buses, underground/subway, and taxi.

--- Insert Table 2 here ---

7. Discussion and conclusions

Taking an environmental friendly means of transportation is closely associated with the desire to only travel short haul (Peeters and Schouten, 2006; Becken, 2002b and 2003). Given this, and at first sight, the results indicate that travellers are more likely to use trains either: (1) when they visit friends or relatives, or (2) when they travel to an urban area (where their activities can take place in a concentrated geographical area) either for reasons of a city trip, a language trip, or study tour. While the first proposition is directly supported by the results, the second one is also gleaned from the activities portfolio, as is selection of means of transport within the destination (the use of trains to the destination is significantly associated to the use of public transportation within the destination — that is, trains, subways/undergrounds as well as taxis). We might conclude that trains are used as a major means of transportation at the destination if a car is not necessarily needed, or its use might be inconvenient to a certain extent (in terms of costs, availability of parking space, and so on), and where there is either good public transportation within the destination or a private vehicle available to drive around in the destination (such as when visiting friends and relatives). This type of result has already been suggested by Becken (2002b and 2003), who recommends - among other measures - encouraging and improving public transport systems to help tourists choose more energy efficient travel modes. Also, Peeters and Schouten (2006) argue that the improvement of the ecological footprint is closely related to the transport mode; by taking trains for their major haul, visitors to a destination also have a high affinity towards using public transportation when at the destination.

Additionally, and supported by the activities portfolio, taking a train is also associated with physical touring activities such as hiking and bicycling/mountain biking. For the international audience it is relevant that an increasing number of public transport companies in Switzerland and its neighboring countries have been teaming up for quite some time with tourism providers in offering hiking/walking or biking tours. This is why this phenomenon can be considered local in character, however worthy of imitation in other contexts (even in non-mountainous areas). In contrast, activities which necessitate the transport of (sports) equipment likely lead to the use of cars instead of trains. Such activities include all types of winter sports (most Swiss still do winter sports) and some other types of sports such as rowing (which implies the transport of a boat).

Two particularities are worth discussing. First, while the activity “basking in the sun” increases the train’s odds, the activity “spend time at the beach” leads to a decrease of odds. This might be a contradiction, because basking in the sun can be assumed to be associated with spending time at the beach. However, the counter-argument is that there are many different locations where one can enjoy the sun, including mountain areas while taking a break during a hike. Second, while the activity “bicycling/mountain biking” increases the odds of using a train, the use of a bicycle within the destination decreases the odds. Again, there may be a contradiction in results. The scaling of the two variables under investigation might affect this: the first one is metric in nature, while the second is dichotomous (indicating if a bicycle is used at all), potentially leading to such a result.

The key insight resulting from this study is that if private transport is not required to transport equipment to the destination or for getting around the destination, tourists will be more likely to choose an environmentally friendly way of travelling to the destination. As a consequence there are practical implications as to ways in which destinations can take local measures to stimulate the choice of environmentally friendly means of transport to the destination. For example, free transport services for tourists around the destination (e.g. hop-on-hop-off buses) or free bike-renting and returning stations could be offered, free or low priced equipment hiring options could be made available and broadly communicated, or transport of sporting equipment on trains could be made complimentary. Such measures not only have the potential of reducing the need to travel to the destination by private car, but also encourage use of more environmentally friendly modes around the destination, possibly making the experience at the destination more pleasurable. Other measures may be to make parking more expensive or less available in order to reduce private vehicle use.

This study has a number of limitations. Firstly, it focuses on short-haul travel. In so doing it excludes from analysis long-haul travel which causes a larger global environmental footprint (for example, long-haul air travel). Secondly information about the reasons why tourists choose short-haul travel, and more specifically, short-haul city travel was not collected in the survey. It would be interesting to conduct a follow-up study that would enable not only a general profiling of tourists who engage in short-haul city travel but also a more specific motivational profiling which could potentially be used to develop communication messages attractively promoting this environmentally sustainable form of tourism. Finally, highly repetitive trips, such as trips to second homes, were likely not recorded by respondents and are therefore not included in the study. Follow-up studies should include these trips as they also are likely to represent highly environmentally friendly vacation options.

With regard to further studies, additional motives behind city trips, as well as physically active types of holidays, need to be investigated. It will be necessary to know under which conditions a planned long-haul trip would be substituted by short haul travel incorporating the characteristics described before and which measures would have to be taken (e.g. lowering prices, providing better transport infrastructure) to make short-haul travel more attractive to people currently preferring long-haul travel. As tourism marketers not only have to compete within a given choice set but also need to be considered at the top of such a choice set, this knowledge would enable better targeting.

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Table 1: Share of transport mode among respondents

Transport mode	% of sample
Car (owned or rented), motor home	48.9
Train	15.9
Scheduled flight direct/non stop	12.6
Charter flight	6.1
Scheduled flight with transfer	5.6
Bus	3.7
Boat, ship	0.7
Motor bike and similar	0.4
Bicycle and similar	0.2
Other	0.2
N/A	5.8
Total	100%

Table 2: Items in model and coefficients

Items in model	B	S.E.	Wald	df	Sig.	Exp(B)	Change in odds
Number of travel companions from household	-0.2842	0.0353	64.9781	1	0.0000	0.7526	-24.7%
Number of travel companions (children < 14)	0.0199	0.0075	7.0768	1	0.0078	1.0201	2.0%
Type of trip: City trip	0.1470	0.0425	11.9697	1	0.0005	1.1583	15.8%
Type of trip: Health oriented vacation (Fitness/Wellness)	-0.1108	0.0493	5.0485	1	0.0246	0.8951	-10.5%
Type of trip: Regimen break	-0.2352	0.1092	4.6347	1	0.0313	0.7904	-21.0%
Type of trip: Winter vacation in warm areas with warm weather	-0.3174	0.1332	5.6809	1	0.0172	0.7281	-27.2%
Type of trip: Theme park vacation/trip	-0.1538	0.0732	4.4156	1	0.0356	0.8574	-14.3%
Type of trip: Study tour (predominantly private)	0.1832	0.0749	5.9763	1	0.0145	1.2010	20.1%
Type of trip: Language trip predominantly private)	0.3075	0.1317	5.4512	1	0.0196	1.3600	36.0%
Type of trip: Shopping trip	-0.2190	0.0680	10.3831	1	0.0013	0.8033	-19.7%
Type of trip: Visit friends and relatives	0.2341	0.0338	48.1049	1	0.0000	1.2638	26.4%
Sports: walking/hiking	0.7527	0.2645	8.0994	1	0.0044	2.1227	40.7%
Sports: bicycling and mountain biking	1.6378	0.9296	3.1046	1	0.0781	5.1441	416.1%
Sports: rowing/paddling	-9.6096	4.4148	4.7378	1	0.0295	0.0001	-100.0%
Sports: other ballgames	0.7527	0.2645	8.0994	1	0.0044	2.1227	112.3%
Sports: horse riding	1.6378	0.9296	3.1046	1	0.0781	5.1441	414.4%
Sports: downhill ski/carving on slopes	-1.5419	0.1757	77.0380	1	0.0000	0.2140	-78.6%
Sports: cross country ski	-1.2727	0.5722	4.9464	1	0.0261	0.2801	-72.0%
Sports: tobogganing/sledging/bob/skeleton	-0.8797	0.4182	4.4239	1	0.0354	0.4149	-58.5%
N/Sports: excursions by car	-1.9936	0.2806	50.4874	1	0.0000	0.1362	-86.4%
N/Sports: excursion by mountain railway/cableway/chairlift, and so on	0.6535	0.1894	11.9048	1	0.0006	1.9222	92.2%
N/Sports: sightseeing (built and natural objects)	-0.3979	0.1421	7.8358	1	0.0051	0.6717	-32.8%
N/Sports: visit museums	0.4983	0.2378	4.3918	1	0.0361	1.6459	64.6%
N/Sports: go to the theatre/movies	0.8307	0.3332	6.2133	1	0.0127	2.2948	129.5%
N/Sports: get to know other/new people	0.2988	0.1107	7.2890	1	0.0069	1.3482	34.8%
N/Sports: go to lectures/exhibitions	0.7245	0.2987	5.8829	1	0.0153	2.0637	106.4%
N/Sports: go to fairs	-1.0994	0.4276	6.6103	1	0.0101	0.3331	-66.7%
N/Sports: spend time basking in the sun	0.5725	0.1995	8.2363	1	0.0041	1.7727	77.3%
N/Sports: spend time at the beach	-1.1801	0.3233	13.3190	1	0.0003	0.3073	-69.3%
N/Sports: go to parties of any kind	-0.8015	0.2672	8.9999	1	0.0027	0.4487	-55.1%

Transport within destination = car (own/rental), motor home (own/rental)	-1.4048	0.0634	490.5231	1	0.0000	0.2454	-75.5%
Transport within destination = railway/train	0.7269	0.0592	150.6809	1	0.0000	2.0686	106.9%
Transport within destination = bus	0.2027	0.0534	14.4021	1	0.0001	1.2247	22.5%
Transport within destination = motor bike/motor cycle	-2.2457	0.7160	9.8373	1	0.0017	0.1059	-89.4%
Transport within destination = bicycle	-0.3700	0.1114	11.0243	1	0.0009	0.6907	-30.9%
Transport within destination = mountain railway/chairlift, cableway, and so on	-0.2374	0.0677	12.2981	1	0.0005	0.7887	-21.1%
Transport within destination = subway/underground	0.3887	0.0928	17.5523	1	0.0000	1.4750	47.5%
Transport within destination = taxi	0.4059	0.1007	16.2566	1	0.0001	1.5006	50.1%
Constant	-1.9783	0.5471	13.0765	1	0.0003	0.1383	-86.2%