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Travel footprint, or how responsibly and sustainably do professionals creating and providing travel experiences behave?

In the 21st century, sustainability has become a prominent issue in the tourism sector. While conscious and responsible consumer decisions are increasingly prioritized in our daily lives, the question arises whether similar scrutiny is applied during leisure and business travel. In this recent empirical research, these questions are examined in detail in the light of the travel habits of tourism experts. The findings indicate that tourism professionals make more conscious consumer decisions in their daily activities compared to when they engage in leisure or business travel, where economic considerations tend to take precedence amidst today's macro-environmental changes, alongside a preference for compressed experiences. We further investigated the extent to which tourism professionals attending a professional conference on sustainability behaved consciously and responsibly when choosing their mode of transportation to attend the event. In this regard, we calculated their travel footprint, which is consumption-based and solely based on the use of transportation modes. We introduced this indicator on a pilot basis, with plans to apply it more extensively and over longer timeframes in the future, and to compare it across different target groups. Our main findings that tourism professionals surveyed in the research consider sustainability to be important and even prominent in their daily activities, and less so in their business activities, only 11% of them consciously choose the means of transport.

Keywords: sustainability, travel, ecological footprint

JEL codes: L83, Z82

<https://doi.org/10.32976/stratfuz.2024.20>

Introduction

Our research group has been studying the travel habits of domestic consumers for several years (2021, 2022, 2023) (Behringer et al., 2023). In our most recent study, we paid particular attention to examining the travel habits of tourism experts, as well as the integration of sustainable attitudes into their consumer decisions regarding destination and tourism service choices.

"Tourism is a powerful force for positive change when managed responsibly and sustainably," says Zurab Pololikashvili, the Secretary-General of the United Nations World Tourism Organization⁶¹. The adoption of the Statistical Framework for Measuring the Sustainability of Tourism represents a paradigm shift, going beyond GDP to measure what matters most to people and the planet. Our research group aims to contribute to this noble cause and value creation; thus we have set out to examine the perspective of responsible and sustainable management in this study regarding the habits of creators of tourism services and comparing them. The survey of travel habits of the experts was conducted on a sample of 74 individuals.

The methodological innovation of our research lies in the novel application of calculating travel ecological footprints. Our respondents were participants of a conference held annually on a

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specific theme, organized around World Tourism Day, as recommended by the United Nations World Tourism Organization (UN Tourism), and held on September 27, 2023. These participants attended lectures and professional debates on sustainability topics. The professional event was organized by the Budapest Metropolitan University/higher education institution with several objectives, including joining World Tourism Day, presenting to the profession, drawing attention to the responsibility of tourism organizations and businesses in producing conscious and responsible tourism offerings, and initiating the measurement of participants' consumption-based travel footprints.

In light of the above, our study seeks to answer the following questions:

- What role does sustainability and environmental consciousness play in the travel decisions of tourism professionals?
- Is there any difference observed between the business travels of professionals, and their conscious and responsible activities in their daily routines?
- What scale of travel footprint did the tourism professionals leave behind as a result of their participation in a conference focused on sustainability?

The questionnaire survey was conducted in September 2023, during the preparation and follow-up of the conference related to World Tourism Day. The conference aimed to highlight the importance of sustainable and responsible tourism, so by querying the participating professionals, we expected to gather relevant information regarding how theoretical interest in sustainable tourism manifests in everyday travel decisions and the selection of holiday destinations. The current study partially processes the questionnaire, focusing specifically on examining travel related to the conference.

Sustainability Theory and Interpretation in Tourism

The concept of sustainability has increasingly come to the forefront in the field of tourism. Tourism is a significant economic sector, yet it faces numerous environmental and social challenges, being both a victim and a contributor. Research highlights the importance of integrating environmental and economic components for sustainable development (Manea & Cozea, 2022). Therefore, there is growing attention towards the theoretical foundations and practical implementation of sustainable tourism, supported by various international organizations.

The 2023 World Tourism Day of the United Nations World Tourism Organization focused on sustainable and responsible tourism, as well as promoting green and innovative investments (UNWTO, 2023), underscoring the increasingly urgent need for solutions in this area. The development of tourism can only occur on sustainable grounds through high-level collaboration among stakeholders (Bhaskara & Filimonau, 2021). As the role of tourism in human life continues to grow, sustainability is becoming unavoidable not only in everyday life but also in travel.

Environmental consciousness is an important factor in daily life, with the majority considering themselves environmentally conscious (MacInnes et al., 2022). However, the choice of eco-friendly services in tourism remains relatively low (Lukács et al., 2022). There are differences in individual awareness based on education and social status (Muth, 2022; Kupi & Szemerédi, 2022), emphasizing the role of education and social factors in reacting to climate change. Among university students, there is openness to sustainability and recognition of its importance, but they are reluctant to sacrifice convenience (Kántor, 2022), highlighting the role of service providers in offering products that inherently consider sustainability. Conversely, the older generation is more conscientious about environmental sustainability and eco-conscious travel practices. They are willing to make sacrifices and endure discomfort to protect the environment (Gonda & Raffay, 2021).

A study examining environmentally conscious tourism behaviour identified nine factors influencing tourists' behaviour. These factors include *knowledge* (awareness of the

environment), *attitude* (inclination towards specific actions), *values* (long-lasting guiding principles), *emotions* (positive and negative attitudes towards certain behaviors), *personal and social norms* (internal and external motivators), *cognitive dissonance* (harmony or conflict between attitudes and behaviours), *everyday environmental consciousness* (escaping from the familiar environment during travels), and *habits, practices* (routine behaviour during travels) (Hegedüs et al., 2023). Together, these factors determine to what extent a tourist is willing to behave in an environmentally friendly manner.

To promote the sustainability of tourism, it is important for tourism providers and decision-makers to consider these factors and implement measures that encourage environmentally friendly behaviour. This may involve targeted educational programs, offering positive experiences that consider natural and social environments, influencing social norms and habits, and introducing incentives that promote sustainability. These measures form the basis for the sustainable development of tourism.

Encouraging responsible behaviour among travellers is crucial in sustainable tourism. Various initiatives and campaigns by tourism stakeholders aim to draw attention to the local environment and culture, forming the basis for measures against mass tourism. These include engaging local communities, preserving cultural heritage, and distributing economic benefits among the local population. This provides an opportunity for local residents to participate in tourism, transforming them from mere victims of its negative aspects into beneficiaries. Incorporating sustainable practices into tourism experiences and offering sustainable options can encourage tourists to adopt environmentally friendly behaviours. One such example is the "from producer to consumer" strategy, which promotes regional cultural heritage through collaboration between local producers and tourism service providers (Dankó, 2023).

It is also important to consider that efficiency problems arising from production processes and technological deficiencies in tourist regions, as well as underemployment, limit the foundations of sustainable development (Nguyen et al., 2024), which can only be supported by public policy initiatives. Not only service providers, local residents, and tourists play significant roles, but also the cooperation of all stakeholders and regional, national, and international regulatory and strategic collaboration is necessary (Gössling, 2012). Furthermore, it is important to introduce sustainable technologies and innovations, for example, in accommodations and catering establishments. This includes the use of renewable energy sources and the introduction of up-to-date water and waste management solutions.

Although mass tourism still dominates the supply and demand within the tourism industry, there is a growing number of people who recognize the negative environmental impacts of tourism and strive to minimize or avoid them during their travels. The strengthening of environmentally conscious consumer attitudes is expected to act as an incentive for tourism service providers to adopt more environmentally friendly practices, which is particularly important for the long-term sustainable development of tourism.

Travel Footprint Measurement

The Ecological Footprint (EF) is one of the best-known alternative economic indicators. Its creation stemmed from the recognition that measuring economic performance solely in monetary terms is insufficient from a sustainability perspective. According to the EF concept, the consumption of any community can be expressed in terms of the land area required for the production of goods and services (Kitzes et al., 2009). The concept of Ecological Footprint utilizes six land-use categories: *Cropland*, *Grazing land*, *Forest footprint*, *Fishing ground*, *Built-up land*, and *Carbon footprint* (Wackernagel & Beyers, 2019). This indicator can be used at both micro and macro levels, with a general observation being that if something can be expressed in monetary terms, its ecological footprint can also be interpreted. The Global Footprint Network calculates the ecological footprint of countries annually and makes the data table used for this calculation available (Galli et al., 2020). Similarly, several indicators with similar concepts have

been developed (carbon footprint, GHG footprint, water footprint, etc.), collectively referred to as the "footprint family" in the literature (Harangozó et al., 2016).

A common question arises as to why we should use the ecological footprint measurement method if it is suitable for all purposes served by money. The literature argues that its use is primarily justified because unlike money, the concept of "too much" is interpretable with the ecological footprint, as biological capacity - the supply side of ecological footprint accounts - also represents a natural limit to consumption (Toth & Szigeti, 2016). This represents the inherent advantage of the ecological footprint over other types of footprint indicators. The ecological footprint is also at the centre of interest for research methodological innovations (Kocsis, 2014).

The ecological footprint indicator faces numerous criticisms (Galli et al., 2019), with one of the most significant being the delineation of the population. Therefore, calculating the ecological footprint of the world or a physically distinct state (e.g., Australia) represents the least of the problems. The freer the movement of the population somewhere, the greater the problem with calculating the ecological footprint.

Travel Footprint Calculation

The calculation of the ecological footprint can fundamentally be approached in two ways. The "*bottom-up*" method involves measuring individual consumption (e.g., using consumption diaries), while the "*top-down*" method relies on secondary statistical data (e.g., census databases) (Harangozó et al., 2019). While the bottom-up method is extremely labour- and time-intensive, the limitations of the top-down method stem from the characteristics of the secondary database. Therefore, the two methods are often combined: available secondary datasets are utilized, and any missing data are supplemented by primary data collection. With this approach, significantly more accurate measurements can be achieved compared to the former. However, the problem with applying a combined methodology is that individual approaches can significantly hinder the comparability of different studies. The ecological footprint finds a wide range of applications (Wackernagel & Beyers, 2019), and it is used in numerous applied research studies to quantify environmental impacts, including travel-related footprints.

Characteristics of Travel Footprint Calculation:

- In national-level calculations, resource use in the transportation sector is highlighted.
- In calculations from the consumption side, the travel footprint primarily appears in the Carbon footprint among the six land-use categories (Rojas et al., 2022). In these calculations, the travel footprint is mainly associated with the fuel consumption of vehicles.
- An important methodological question is that the ecological footprint accounts only for carbon dioxide emissions from fuel use, not other GHG emissions, thus underestimating the true environmental impact.
- If investments are considered, the establishment of environmental infrastructure entails significant environmental burdens (Jóvér et al., 2023). Therefore, it is crucial to consider the time frame for which our travel footprint-related recommendations apply. For example, in the short term, examining existing infrastructure, traveling by train is almost certainly more favourable than by car. However, in the long term, the construction of a new railway line has a huge ecological footprint due to cement consumption; thus, both technology and utilization need to be examined.

In our research, we primarily formulated short-term, consumer-oriented statements, which also represent one limitation of the study.

Materials and Methods

In our primary research, we conducted direct data collection consistent with the research objectives, using self-administered questionnaires in English and Hungarian. The survey was conducted from September 27, 2023, to October 15, 2023. The questionnaire contained closed-ended questions. The questionnaire consisted of three sections, of which our current research processed two parts. The first section included demographic questions. The respondents were participants of a tourism conference (n=74), with two-thirds of the respondents being female (66.2%), and over half (56.7%) aged between 36 and 55 years old. Additionally, more than half of them (54%) were residents of Budapest.

In the second part of the questionnaire, participants were asked questions regarding their travel to the conference. The questions focused on the primary and secondary modes of transportation and the distance travelled. These questions laid the groundwork for calculating the ecological footprint. When formulating the questionnaire questions, we took into account previous research findings suggesting that asking for precise, data-intensive information significantly reduces questionnaire completion rates (Harangozo & Szigeti, 2017). The calculation methodology was adopted from our previous research (Kovács et al., 2017), which we briefly outline below. Using the DEFRA database (Table 1) for CO² conversion factors for different modes of transportation and the distance travelled (Table 2), we estimated the direct carbon dioxide emissions associated with the travel (Table 3). We then converted this into global hectares (the average biocapacity of the Earth's surface) using the conversion factor provided by the Global Footprint Network (the international organization responsible for calculating ecological footprints) (Lin et al., 2018). For easier comprehension, we converted our results into global square meters (gsm), which is one-thousandth of a global hectare. The questionnaire allowed participants to specify both primary and secondary modes of transportation.

Table 1: Conversion Factors

	CO ² kg/passenger-km
Local public transportation (tram, metro)	0.02
Electric bicycle (assuming the smallest motorbike)	0.08
Bus	0.1
Train	0,03
Car (compact car)	0.132

Source: DEFRA, 2023

Table 2: Distance travelled

Modes of transportation	Primary mode of transportation distance travelled (km)	Number of participants using this mode	Secondary mode of transportation distance travelled (km)	Number of participants using this mode	Total distance travelled
Local public transportation	378	33	418	15	796
Train	630	7	60	4	690
Car	1223	29	30	4	1253
Pedestrian	5	1			5
Bus	26	1	12	2	38
Electric bicycle	4	1	4	2	8
Bicycle	38	2	4	2	42

Source: Own research

In the second part of the questionnaire, respondents also received questions regarding environmental consciousness and the awareness of choosing transportation modes.

Results

According to the results of the questionnaire, more than half of the conference participants arrived from Budapest. In line with this, the majority of participants (31 individuals) travelled less than 10 km to the event (Figure 1). One surprising finding of our research, when comparing the results of Table 2 and Figure 1, is that only 4 individuals arrived at the conference by bicycle, and even fewer used electric bicycles. This is particularly surprising considering that the conference was held in pleasant autumn weather, perfect for cycling. Upon further analysis of the responses, it is noteworthy that more than one-third of respondents traveling less than 10 km arrived by car. The high proportion of car arrivals can be explained by the fact that it is still a common travel habit and behaviour for businesspeople to travel by car, which is more comfortable and currently a more familiar attitude, especially among top executives, as reflected in their responses later on.

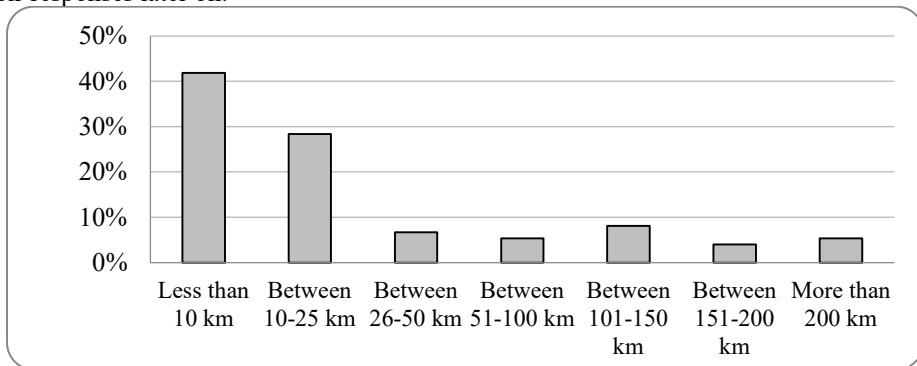


Figure 1: Percentage of Respondents' Travel to the Event

Source: Own research findings, edited by the authors

Based on Table 2, it can be seen that the majority of participants (48 individuals) used public transportation as either their primary or secondary mode of transportation. However, the longest distance travelled (1253 km) was by car. Half of the respondents chose their mode of transportation out of habit when traveling to the conference (Figure 2).

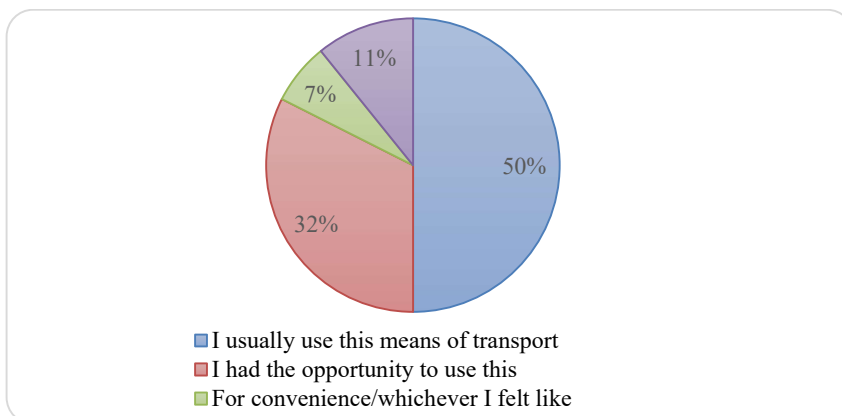


Figure 2: Reasons for Choosing the Mode of Transportation

Source: Own research findings, edited by the authors

80% of the conference's travel footprint is caused by car travel (Table 3), despite the fact that one-third of car users (33 individuals) shared the car with at least one fellow traveller.

Table 3: Conference Travel Footprint

	A	B=A/1000	C=B*0.338	D=C*10,000	E
Mode of transportation	CO ² kg	CO ² t	EF gha	EF gm ²	%
Local public transportation	15.9	0.0159	0.00538	53,8	8
Train	20.7	0.0207	0.00699	69,9	10
Car	165.4	0.1654	0.05590	559	80
Pedestrian	0	0	0	0	0
Bus	3.8	0.0038	0.00128	12.8	2
Electric bicycle	0.6	0.0006	0.00022	2.2	0
Bicycle	0	0	0	0	0
Total			0.06978	697.8	

Source: Own calculation based on DEFRA database and Lin, 2018

Table 4: How much attention do you pay to sustainability aspects, environmentally conscious, responsible behaviour?

Response Options (6 completely)	During Business Travel		Everyday Life	
	Number of Respondents	Distribution of Responses	Number of Respondents	Distribution of Responses
1	2	3%	0	0%
2	7	9%	1	1%
3	15	20%	8	11%
4	20	27%	21	28%
5	27	36%	28	38%
6	3	4%	16	22%

Source: Own research findings

Respondents pay more attention to sustainability and environmental aspects, as well as responsible behaviour, during their everyday life, according to the results of Table 4.

Conclusions

Although tourism professionals surveyed in our research consider sustainability to be important and even prominent in their daily activities, and less so in their business activities, only 11% of them consciously choose the means of transport they use to arrive at the conference.

One methodological innovation of our study was to provide respondents the opportunity to indicate a secondary mode of transportation in addition to their primary mode. This was done with the aim of reducing information loss during the research. Out of the 74 experts who completed the questionnaire, 29 took advantage of this option, which supports the notion that allowing for secondary mode of transportation choices significantly brought us closer to understanding the real travel characteristics.

Based on the research findings, it would be beneficial to initiate carpooling for the next conference and encourage participants to use low-carbon emission transportation modes. This

initiative could effectively demonstrate the commitment of the conference organizers to sustainability and encourage conference participants towards more conscious choices.

Discussion

A limitation of the study is that it was conducted with a small sample of experts, so the results cannot be generalized to a wider community. The thematic nature of the conference topic may have influenced the respondents to provide responses to the questionnaire that were more favourable than their actual preferences. According to the respondents themselves, the conference had an impact on shaping their attitudes (Table 5). While this is advantageous in terms of the conference's objectives, it should be taken into account when evaluating the results of the research.

Given that a high proportion of respondents, regardless of age, selected response option '*Yes, its importance has (somewhat) increased for me*', when asked '*Did your opinion on sustainability and environmental consciousness change based on the conference presentations?*', the authors hypothesise that attending a conference on sustainability will have a positive impact on the travel footprint of professionals in the future. Measuring this will be the subject of our next research at our next tourism conference.

Table 5: Did your opinion on sustainability and environmental consciousness change based on the conference presentations?

	Below 25 years old	Between 25 and 35 years old	Between 36 and 45 years old	Between 46 and 55 years old	Between 56 and 65 years old	Over 65 years old
Yes, its importance has increased for me.	45%	25%	32%	30%	17%	34%
Yes, its importance has somewhat increased for me.	36%	58%	53%	50%	50%	0%
My opinion has not changed about it.	9%	17%	5%	15%	33%	33%
I consider the issue less important.	0%	0%	5%	0%	0%	0%
I cannot comment on it.	10%	0%	5%	5%	0%	33%
Total	100%	100%	100%	100%	100%	100%

Source: Own research findings

The questions regarding ecological footprint did not allow for precise calculation, only expert estimation. It would be worthwhile to test in later stages of the research whether more precise questioning significantly reduces willingness to complete the questionnaire.

The high willingness of car users to share the vehicle with a fellow traveller may be indicative of environmental consciousness (Szigeti et al., 2019), but this requires further in-depth

investigation. Similarly, it is a question requiring further research to what extent the significant use of public transportation can be attributed to the participants' consciousness or whether the main factor in their choice was the fact that the conference venue is located in direct proximity to one of the major public transportation hubs in Budapest.

The calculation of the ecological footprint for the travel footprint is not standardised, so its comparison with other studies is not meaningful. The literature on ecological footprint calculation (Harangozó-Szigeti, 2017) suggests that the results of the calculation should not be compared with other research but used to assess own development. Accordingly, we plan to continue the research this year, where we will have a comparable dataset.

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