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High-Speed Rail in Tourism: Demand Segments and Factors of Their Potential Transition to Alternative Modes of Transport[1]

*Martin ŠAUER – Markéta NOVOTNÁ – Andrea HOLEŠINSKÁ – Jiří VYSTOUPIL**

Abstract

This paper aims to investigate the factors which determine the willingness of visitors to switch to more environmentally friendly transport modes on tourist-oriented journeys in the Czech Republic. The proposed model of the hypothetical shift to a high-speed rail (HSR) considers personal and travel characteristics, the role of environmental attitudes, and previous experience with various transport modes. Data entering the model were obtained through a questionnaire among visitors in three key Czech hubs of the proposed HSR. The sample of 1,800 respondents was selected using a combination of random sampling and a quota applied to the length of stay and nationality. Using the Kruskal-Wallis test and subsequent contingency analyses, strong relationships were identified between train users and their willingness to use HSR. Environmental attitudes led to a strong preference for HSR. Similarly, the time spent on the journey and its purpose affected the willingness to switch to HSR.

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Introduction

Research in tourism often deals with the decision-making process of visitors when choosing a holiday destination. While the purpose of the visit remains a key factor, there are other aspects that can affect the visitors' decision. Therefore, the complex decision-making process in tourism is made up of other multiple sub-decisions, such as length of the stay and mode of transport. The choice of transport mode is an integral part of this process as it facilitates the movement of people across time and space, connecting their place of residence to the chosen destination. The transport mode choice is crucial not only for individual visitors but also for the broader environment and the future of society. Opting for more environmentally friendly modes of transport can help to mitigating environmental impact and promote sustainable development (not only) of tourism.

In the context of sustainable mobility, potential of the construction of a high-speed rail (HSR) and its consequential impacts on sustainable development and competitiveness of regional economies is often discussed. This discourse is driven by a growing recognition of the role of transport in shaping the environmental and economic landscape. High-speed rail systems are often seen as a promising way to increase the efficiency and sustainability of transport networks. To evaluate the potential of HSR in tourism, it is necessary to understand the behaviour of the visitors.

The paper aims to reveal the factors which determine the willingness of the visitors to use HSR. In particular, it discusses the role of pro-environmental attitudes of the visitors and their previous experience with transport modes.

The following research questions (RQs) are proposed:

RQ1: *Is there a strong and statistically significant relationship between visitors arriving by train and their willingness to use HSR?*

RQ2: *Does a positive attitude towards environmental issues reinforce willingness to use HSR among train users? Is there a similar strengthening of willingness among car users?*

RQ3: *Are there types of travel motivations that reinforce willingness to use HSR among visitors arriving by train or car despite positive attitudes towards environmental issue?*

RQ4: *Does age affect visitors' environmental attitudes, and does this transform into their willingness to use HSR?*

RQ5: *How do the country of origin and the presence of HSR in its transport system affect environmental attitudes and willingness to use HSR?*

RQ6: *Does the nature of a visited destination differentiate attitudes of visitors towards environmental issues and influence willingness to use HSR?*

1. Literature Review

Tourism as a movement of people outside their usual environment is about making decisions. Therefore, studies on consumer behaviour in tourism often deal with the decision-making process (e.g., Pagliara et al., 2015; Gutiérrez et al., 2019). Although the purpose of the visit predominantly determines the destination choice, other aspects can also affect the visitors' decision. Therefore, the complex decision-making process in tourism is made up of multiple sub-decisions, which are often interconnected and may be interdependent. The choice of transport mode is an integral part of this process because of the connection between the residence place of visitors and the destination (Decrop and Snelders, 2005). The location and connectivity can significantly determine the destination choice and affect the visitors' behaviour patterns (Šauer and Novotná, 2020).

In relation to the theory of planned behaviour (Ajzen, 1985; Hsiao and Yang, 2010; etc.) the explanation and prediction of mobility behaviour is based on three independent determinants of intension (i. attitude, ii. subjective norm, and iii. perceived behavioural control). Perceived behavioural control (PBC) reflects visitors' past experiences. The determinants for attitude (AT) towards the choice of mode of transport (Hsiao and Yang, 2010; Romão and Bi, 2021) include personal characteristics (e.g., sex, age, income, education level, nationality) and travel-oriented characteristics (e.g., the length of stay, repeat visit, type of accommodation, travel companion). Among the important factors that subsequently influence the choice of transport mode is the time spent in the mode of transport (Hergesell and Dickinger, 2013). At the same time, the aspect of comfort and flexibility (Hergesell, 2017), as well as the quality of the services provided (Pagliara et al., 2012) can be considered when choosing a mode of transport.

In terms of travel-oriented characteristics, visitor preferences and values, companionship arrangement, and destination characteristics can be considered (LaMondia et al., 2010; Le-Klähn et al., 2015). Similarly, the effect of travel purpose (e.g., leisure, business, visit of relatives) on travel mode choice can be considered (Yum, 2020). Variations in travel movement patterns depend also on different lengths of stays (Park and Zhong, 2022). Vice versa, the mode of transport can significantly determine the length of stay in a destination (Gutiérrez et al., 2019). Travel duration, expenses, and organisation stand out when choosing a mode of transport used for tourism purposes (Gross and Grimm, 2018).

Subjective norm (SN) considers the determinants that influence the intension to choose a certain mode of transport (Hsiao and Yang, 2010). These determinants have social context and reflect visitors' lifestyle (Anable, 2005). Barr and Prillwitz (2012) verified that environmental way of thinking encouraged the choice of more sustainable mode of transport. For this reason, it is appropriate to focus on visitors'

attitudes towards sustainability and their pro-environmental behaviour, which could contribute to the willingness to use alternative modes of transport and eliminate additional pressures on the environment (Davenport and Davenport, 2006).

In the context of sustainable mobility, the importance of high-speed rail (HSR) and its effects on sustainable development and regional competitiveness is often discussed (e.g., Guirao and Campa, 2016; Albalate and Fageda, 2016; Campa et al., 2019). To evaluate the potential of HSR in tourism, it is necessary to understand the behaviour of the visitors and their willingness to shift from their current modes of transport to HSR. All above mentioned determinants are fundamental for the model shift connected with the intention of visitors to switch to public transport (Dickinson et al., 2009). Model shifts occur more likely in the situation when there is an integrated offer (Nordlund and Westin, 2013). Therefore, intention to use public transport can be enhanced by the offer of a multi-modal ticket (Lumsdon et al., 2006) and the ease of use (Borhan et al., 2019). Similarly, the environmental concern directly influences the preference to shift (Nordlund and Westin, 2013).

According to Gutiérrez and Ortuño (2017) no specific visitor profile is associated with HSR users. Based on their suggestions to analyse visitors that HSR can attract, it is vital to consider the specific characteristics of each destination and its current market. This paper deals with the conditions of the Czech Republic where HSR has not existed yet. Therefore, the studied intention to use HSR is hypothetical.

2. Materials and Methods

Based on a literature review, some questions regarding the impact of visitors' environmental attitudes on the potential preference of the potential high-speed rail remain unanswered. Our approach is based on already confirmed knowledge about the influence of current travel behaviour and visitors' profile.

Assumed that the current experience with the use of a mode of transport is decisive for the choice of HSR, the model analyses the relations between the various modes of transport and the willingness to switch to HSR on tourist-oriented journeys. Subsequently, it examines the influence of environmental attitudes (user values) and the visitor's profile on the strength of these ties (see Figure 1).

2.1. Methodological Approach and Study Area

Data for the analysis were obtained through a questionnaire survey in three largest cities of the Czech Republic, i.e., Praha, Brno, Ostrava. These cities represent the main transport hubs and are accounted as potential boarding nodes for the proposed high-speed transport system of the Czech Republic (Figure 2).

F i g u r e 1
Selected Concepts and Variables Towards the HSR Choice
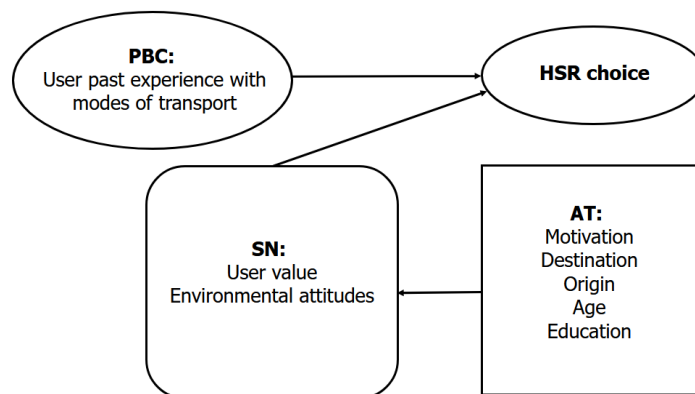
Source: Authors' elaboration.

F i g u r e 2
Spatial Context of the Study
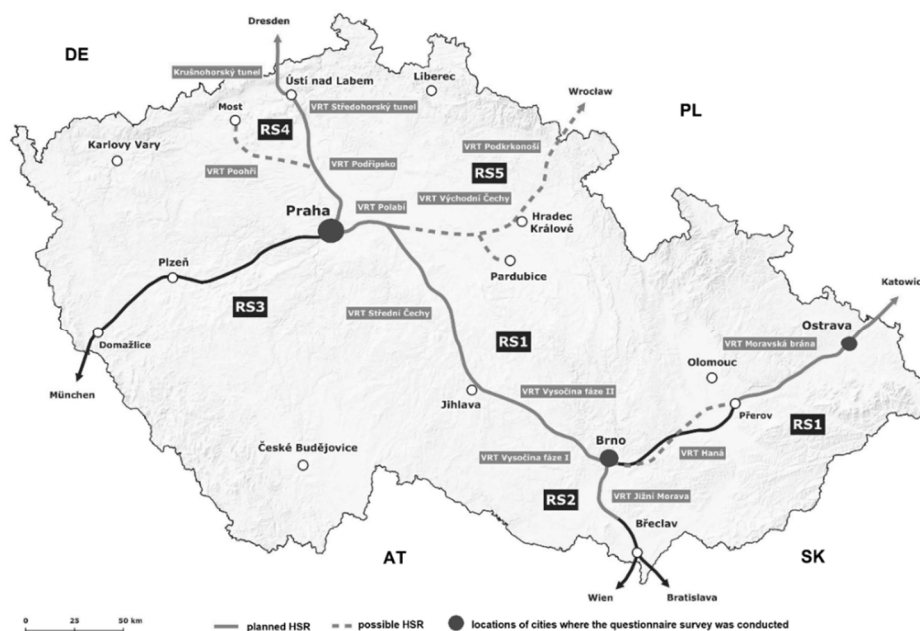
Source: Authors' elaboration based on the Czech Railway Infrastructure Administration.

The questionnaire survey itself focused on tourism participants (visitors) present in the cities. Therefore, it took place in tourist-exposed localities of Praha (e.g., Charles Bridge, Old Town Square, Praha Castle), Brno (e.g., the city centre,

Villa Tugendhat, Brno Exhibition Grounds), and Ostrava (e.g., the city centre, Silesian-Ostrava Castle, The Lower Vítkovice area, ZOO). It examined mobility behaviour of tourism participants, their decision-making process, and the factors that influence it.

Data collection took place from August to the end of October 2019 through face-to-face interviews. The period of the interview time corresponds to the high season with an extension into the low season. All interviewers underwent initial training according to SIMAR principles, focused on methodological standards of data collection (STEM/MARK, 2019).

After the end of the field phase of data collection, the work of interviewers on a group of 10% of randomly selected respondents was checked by telephone inquiry and e-mail correspondence. This procedure sought, among other things, to eliminate the error caused by human failure.

The sample was set at 1,800 respondents (800 in Praha, 600 in Brno, 400 in Ostrava). Respondents were selected using a combination of random and quota sampling. The quota was applied to the length of stay of visitors (one-day visitors/ excursionists vs. overnight visitors/tourists) and nationality (domestic vs. foreign visitors). In addition to domestic, i.e., Czech respondents, visitors from the following countries were interviewed: Germany, Austria, Slovakia, Poland, Slovenia, Hungary, and Switzerland. The choice of countries was influenced by the potential of urban accessibility in terms of the future HSR network in Central Europe (see Šauer et al. 2021).

2.2. Survey Design

The questionnaire was divided into three sections. The first one focused on the current behaviour of respondents. The key question in terms of the aim of the paper was about the transport modes used by respondent to reach the destination. The current choice of transport mode was examined under clearly defined context (e.g., with whom she/he arrives to the destination, what was the main purpose of visit and activities carried out in the destination, etc.). The second part of the questionnaire focused on the position of destination accessibility in deciding on the choice of destination.

Finally, the third part of the questionnaire dealt with the potential willingness to use the HSR for their journey to the destination in the future. The hypothetical question was formulated so that the respondent could evaluate all the basic conditions under which the decision would be made. The high comfort of the service and the price at the level of current trains of the highest quality were clearly defined. Moreover, the respondent answered what savings of travel time (25%; 33%; 50% of a period) would motivate them to use HSR for the journey.

In addition to the basic sorting/analytical questions, the questionnaire also included questions focused on the environmental attitude of the respondents. Degree of agreement with the statement "I am willing to pay more for transport if this would help the environment" was recorded on the 5-point Likert scale, where 1 meant an absolute agreement and 5 an absolute disagreement.

2.3. Variables

The individual variables that enter the model unfold from the structure of the questionnaire used in the survey. Table 1 provides an overview of the variables considered in the model.

T a b l e 1
Variables Entering the Model

Concept		Variables	Item	Values	Type of variable
Choice model		HSR_choice	Willingness to use HSR	2 = yes 1 = no 0 = I do not know	Nominal
User value		Envi	I am willing to pay more for transport if this would help the environment	1 = completely agree 5 = completely disagree	Ordinal
User experience		Mod	Mode of transport to get to the city	1 = car 2 = bus 3 = train 4 = other	Nominal
User profile	Travel-oriented	Motivation	What is the main purpose of visiting city	1 = tourism 2 = friends/relatives 3 = business 4 = short leisure visit	Nominal
		Destination	Visiting city	1 = Praha 2 = Brno 3 = Ostrava	Nominal
	Personal-oriented	Origin	Country with HSR in operation	1 = yes 0 = no	Nominal
		Age	Visitor age	1 = 15 – 19 2 = 20 – 34 3 = 35 – 44 4 = 45 – 54 5 = 55 – 64 6 = 65+	Ordinal
		Edu	Highest education achieved	1 = elementary 2 = secondary 3 = college/university	Ordinal

Source: Authors' calculation.

An independent variable is the willingness to use HSR. In general, the independent variable is influenced by the experience with the current transport mode (user experience), value anchoring in relation to environmentally friendly transport

mode (user value) and the visitor profile (user profile). While user value and user experience are modelled through a single variable, a user profile is a combination of five dependent variables that include age, education, origin, travel motivation/ purpose, and destination. All variables have a nominal form, some of the original variables were recoded to nominal (e.g., willingness to use the HSR).

2.4. Data Analysis

A correlation coefficient based on chi-square statistics was chosen as the basic method for the tightness of the relations between the dependent variables and the independent variable.

Since most variables take on a higher number of categories (variables are polytomy), the contingency measure Cramer's V was used. The analysis was based on an examination of the strength of the relations between the choice of the current transport mode and the willingness to use the HSR. The influence of other variables was examined by introducing conditional variables into the above relationship. Such a basic conditional variable was attitude to the environment. Subsequently, a particular attitude to the environment (specifically a certain degree of willingness to pay for more environmentally friendly transport) led to strengthening or weakening the correlation coefficient Cramer's V.

The differences between correlation coefficients were tested by equality test of two correlation coefficients for two independent selections Zobs (see Pallant, 2001, p. 128). If the test result is in the range <–1.96; +1.96>, the difference is statistically insignificant. Conditional correlations were calculated both for the basic set (by the action of only different levels of attitudes to the environment) and for individual categories that define the user profile (age and education group, different motivations, target cities or visitor's origin). Using this procedure, it identified those variables that strengthen the overall correlation between the chosen transport mode and the attitude towards the HSR.

The analysis of contingency tables was supplemented by a sign test (more in Řehák and Řeháková, 1978), which looked for statistically significant differences between observed and expected frequencies.

The symbol + means that the observed frequencies are higher than expected and the symbol – the opposite situation that the observed frequencies are lower than expected (Rabušic et al., 2019). The number of signs indicates the probability of error (+ alpha = 0.05; ++ alpha = 0.01; +++ alpha = 0.001; by analogy for negative values). The subject of these analyses were only those respondents who answered all the questions that enter our model as variables. The total number of respondents thus decreased to 1,666.

3. Results

3.1. Description and Characteristics of the Research Sample

The sample (Table 2) does not correspond to the structure of the general population. On average, respondents are younger and more educated. More than 2/3 of the sample consists of visitors under the age of 44. The majority of respondents is in age group 20 – 34, followed by 35 – 44. At the same time, 1/3 of respondents are well-educated (university or college graduates). Only +/–3% has basic or no education. In terms of gender, women slightly outnumber men.

T a b l e 2

Structure of the Research Sample

Characteristics	Use HSR	Not use HSR	Do not know	Total	Sig. level (χ2 test)/Sig. level (Kruskal-Wallis test)
Total	53.6	28.9	17.5	100.0	
Gender (n = 1,782)					0.000
Male	44.4	54.8	51.1	48.5	
Female	55.7	45.2	48.9	51.5	
Age (n = 1,764)					0.119 (K-W)
15 – 19	2.9	1.2	3.0	2.4	
20 – 34	34.8	42.0	39.3	37.6	
35 – 44	29.6	30.0	23.1	28.6	
45 – 54	16.9	12.3	13.5	15.0	
55 – 64	9.6	9.6	11.5	10.0	
65+	6.2	4.9	9.6	6.4	
Educational level (n = 1,762)					0.324 (K-W)
Elementary/no qualification	1.5	3.1	2.6	2.2	
Secondary	65.0	65.8	62.2	64.7	
College/university degree	33.5	31.1	35.2	33.1	
Type of visitor (n = 1,728)					0.000
Tourist	70.8	64.0	57.8	66.5	
Excursionist	29.2	36.0	42.2	33.5	
Travel companion (n = 1,760)					0.000
With partner	27.7	28.4	21.0	26.8	
With friends	13.9	14.3	27.9	16.4	
Alone	27.1	27.1	15.7	25.1	
With family	20.2	21.8	23.0	21.1	
With colleagues	11.1	8.4	12.5	10.6	
Motivation (n = 1,781)					0.000
Holiday	31.2	29.1	21.9	29.0	
VFR	20.0	21.7	29.3	22.1	
Leisure	15.8	21.6	23.5	18.8	
Business	28.1	24.5	21.2	25.8	
Transit	4.9	2.7	4.2	4.2	
Others	0.0	0.4	0.0	0.1	

Mode of transport (n = 1,781)					0.000
Car	22.2	63.5	49.4	38.9	
Train	63.8	23.7	26.0	45.6	
Bus	11.8	7.2	17.9	11.6	
Others	2.1	5.6	6.7	3.9	
Destination (n = 1,783)					0.000
Ostrava	17.8	30.1	24.0	22.4	
Praha	53.8	36.7	28.2	44.4	
Brno	28.5	33.2	47.8	33.2	
Residency (n = 1,783)					0.000
Poland	7.9	15.3	13.8	11.1	
Czech Republic	50.1	53.0	43.4	49.7	
Austria	17.0	7.8	7.4	12.6	
Slovakia	9.1	7.0	19.3	10.3	
Germany	13.0	13.0	13.2	13.0	
Others	3.0	3.9	2.9	3.3	
Time spent on a journey (n = 1,777)					0.000
More than 4 hours	34.8	15.5	19.3	26.5	
121 min – 4 hours	36.6	33.0	40.8	36.3	
61 – 120 min	20.2	26.6	25.7	23.0	
31 – 60 min	7.2	17.7	12.2	11.1	
Up to 30 min	1.3	7.2	1.9	3.1	

Source: Authors' calculation.

About a quarter of respondents consists of visitors arriving alone and with a partner. More than one-fifth of the sample are families with children. The most common motivation to travel is a holiday (29%), followed by business trips (26%) and visiting friends and relatives (VFR). Respondents mainly travel by train (46%) and by car (39%). The share of bus users is 12%. According to the variable time spent on a journey, long-distance visitors predominate in the sample. More than one-third of respondents spend 2 – 4 hours on their journey, and 27% even more than 4 hours. There is a direct proportion between the duration of a journey and the number of respondents. Concerning the variable residency, almost the half of the sample are Czechs, and the others are mainly from neighbouring countries – Germany, Austria, Poland, and Slovakia (in accordance with the design of the survey). The representation of respondents from neighbouring countries is similar (from 10% to 13%).

The data show that women have relatively higher willingness to use HSR than men. Furthermore, the willingness increases with the distance from the visitor's place of origin. The length of stay determinates the willingness to use HSR, as well. However, in terms of travel companion, attitudes towards the HSR are not entirely clear. More often there are differences between visitors who hesitate and those who have a clear opinion about using HSR. Respondents who travel with colleagues have higher intention of using HSR. The data show that attitudes

towards the use of HSR are influenced by the purpose of the trip. Business trips, holidays and transit make visitor to use HSR more often contrary to VFR and one-day leisure trips that have below-average motivation.

The key variable that significantly differentiates the examined attitudes is the mode of transport to a destination. Clearly, there is an antagonistic relation between the train and the car. Whereas train users express positive attitudes towards HSR, car users usually show negative attitudes. In case of bus users, there are relatively more undecided visitors, however once they decide, they prefer HRS.

The geographical aspects of using HSR are examined both in terms of the country of visitors' origin and in terms of destination the visitors chose. Both points of view are different. Compared to other cities, visitors to Praha have greater willingness to use HSR, while willingness of visitors to Ostrava is below average. There is a high proportion of undecided respondents in Brno that detracts "use HSR".

The geographical origin of the respondents in the sample is affected by the applied quota. However, in terms of "use HSR", there are significant differences between each source markets. There is a strong preference for using HSR among Austrian visitors, while in the case of Polish visitors the preference is below average.

3.2. Correlation Analysis of Selected Variables

Firstly, the analysis of correlations between the variables and the attitude of visitors to the use of HSR. All the above variables that have passed the $\chi2$ or Kruskal-Wallis test are included in the analysis. The variable of age and education are excluded. Therefore, the answer to RQ4 is negative.

T a b l e 3
Contingency Rates Calculated Using Cramer's V

Variable	Code	Cramer's V	Sig.
Destination	Dest	0.167	< 0.001
Motivation	Motiv	0.114	< 0.001
Country_HSR	C_HSR	0.108	< 0.001
Origin	Origin	0.156	< 0.001
Type of visitor	Visitor	0.104	< 0.001
Time spent on the journey	Time	0.207	< 0.001
Mode of transport	Mode_T	0.319	< 0.001
Travel companion	T_companion	0.131	< 0.001
Environmental attitudes	Enviro	0.232	< 0.001

Source: Authors' calculation.

Table 3 shows the contingency calculated by Cramer's V. The highest degree of coherence (i.e., from medium to substantial, see De Vaus, 2002) is identified for the variable "mode of transport" – car, and then for the variable "environmental

attitudes". This confirms that the chosen concept is relevant. So, the relationship between the mode of transport and the attitude to the use of HRS is analysed and the environmental attitudes of the respondents are considered as conditional variable.

T a b l e 4

Contingency Analysis

Indicator	Mode	I do not know	Not use HSR	Use HSR	Total
Mode of transport	Train	70	119	570	759
	Car	145	315	195	655
	Bus	51	35	104	190
	Others	20	27	15	62
	Total	**286**	**496**	**884**	**1,666**
	Train	9.2%	15.7%	75.1%	100.0%
	Car	22.1%	48.1%	29.8%	100.0%
	Bus	26.8%	18.4%	54.7%	100.0%
	Others	32.3%	43.5%	24.2%	100.0%
	Total	**17.2%**	**29.8%**	**53.1%**	**100.0%**
Sign Scheme	Train	---	---	+++	
	Car	+++	+++	---	
	Bus	+++	---	**o**	
	Others	++	+	---	
Environmental attitude (Envi)	Completely agree	34	60	283	377
	2	115	108	304	527
	3	83	184	198	465
	4	36	97	67	200
	Completely disagree	18	47	32	97
	Total	**286**	**496**	**884**	**1,666**
I am willing to pay more for transport if this would help the environment.	Completely agree	9.0%	15.9%	75.1%	100.0%
	2	21.8%	20.5%	57.7%	100.0%
	3	17.8%	39.6%	42.6%	100.0%
	4	18.0%	48.5%	33.5%	100.0%
	Completely disagree	18.6%	48.5%	33.0%	100.0%
	Total	**17.2%**	**29.8%**	**53.1%**	**100.0%**
Sign Scheme	Completely agree	---	---	+++	
	2	+++	---	+	
	3	**o**	+++	---	
	4	**o**	+++	---	
	Completely disagree	**o**	+++	---	

Note: Sig. p = < 0.001.

Source: Authors' calculation.

There is clear evidence that the mode of transport affects willingness to use HSR and attitudes to HSR as well. Pearson Chi-Square (p = 0.000) indicates statistically significant differences in the distribution of responses. The Sign Scheme identifies the strong relation between train users and the willingness to use HSR.

So, the first RQ1 is confirmed (Is there a strong and statistically significant relation between train users and the willingness to use HSR?). On the contrary, car users have greater tendency not to use HSR. In comparison to other mode of transport, there is a strong representation of visitors who are undecided among car and bus users. Concerning environmental attitudes, there is a logical distribution of responses. Significant willingness to use HSR show visitors who are willing to pay extra for sustainable transport. This proves responses of those who "completely agree" with the statement. The more "completely disagree" statements about willingness to pay extra for sustainable transport appear, the higher number of respondents do not know whether to use HSR. Nevertheless, there is a certain tendency to use HSR as well. Data reveals that "neutral" and "disagree" statement to environmental attitudes leads to the non-use of the HSR (see Table 4).

3.3. Conditional Correlation Analysis

The conditional variable *Envi* is conducted to verify RQ2. In the case of "completely agree" statement with paying more for environmentally friendly transport, the implication of the conditional variable causes that the correlation coefficient strengthens from 0.319 (Cramer's V) to 0.449. The difference between the two correlation coefficients is statistically significant (Zobs = –2.35). Thus, the emphatic attitude to the issue of sustainable transport reinforces the relation between train users and willingness to use HSR. Concerning the rest of visitors' statements ("agree" and "neutral") to environmental issues Cramer's V does not grow (see Table 5).

T a b l e 5

Implication of the Conditional Variable

Envi	Completely agree			Agree			Neutral		
	Do not know	*Do not use*	*Use*	*Do not know*	*Do not use*	*Use*	*Do not know*	*Do not use*	*Use*
Bus	o	---	o	+	o	o	+++	---	o
Car	+++	+++	---	+++	+++	---	o	+++	---
Other	+	o	o	o	o	---	o	o	o
Rail	---	---	+++	---	---	+++	---	---	+++
Envi	**Disagree**			**Completely disagree**			**Total**		
Bus	o	o	o	o	o	o	+++	---	o
Car	o	+++	---	o	o	o	+++	+++	---
Other	o	o	o	o	o	o	++	+	---
Rail	o	---	+++	o	o	+	---	---	+++

Source: Authors' calculation.

In terms of bus users, the tendency to use HSR corresponds to general (average) patterns of visitor's behaviour. Data shows slight indecision (especially in the case of a neutral statement to pay more for environmentally friendly transport). This means that pro-environmental attitudes lead to a strong willingness to use HSR (e.g., 80% of respondents expressed the willingness to use HSR for travel to a destination). On the other hand, data about the negative attitude to environmental issues do not provide statistically significant results.

Overall, car users weaken the positive impact of pro-environmental attitudes on willingness to use HSR. There is only less than 39% of willingness to use HSR. Nevertheless, the environmental attitudes make visitors rise their willingness to HSR (from 29.8% "completely agree" and "agree" to 36%). The growth of willingness is statistically significant (p = 0.02, alpha = 0.95). In general, the willingness is below average, hence the negative signs in Table 5 above. Thus, there is a significant improvement in HSR support, and the dependent variable contributes to a higher preference for HSR for car users (for those who prefer environmentally friendly transport).

The train was identified as a mode of transport that has a key impact on the hypothetical use of HSR. Positive environmental attitudes further strengthen this relationship. The statement "completely agree" to pay extra for environmentally friendly transport leads to up to 84% willingness to use HSR (p < 0.000), alpha = 0.95). Concerning other statements, willingness to use HSR is also above average.

Other modes of transport do not show statistically significant differences in the impact of visitors' environmental attitudes. The reason is the low number of responses in this category.

3.4. The Influence of Selected Factors

Table 6 presents the influence (*) of selected factors on the role of the conditional variable in the model. Different factors have different roles. The correlation is strong mainly at those visitors who have a very positive (completely agree) attitude to the issues of sustainable transport. There is a statistically significant correlation in the relationship between the mode of transport and the willingness to use HSR in terms of business trips. The significance is evident as well as at trips to Praha and at visitors in whom country HSR system operates (Austria and Germany). The correlation is significant also in the case of "neutral" attitudes towards environmentally friendly transport. It considers journeys for the purpose of holiday (long-term stay) and leisure (short-term stay). The duration of the journey is another factor that influence the conditional variable, see "more than 4 hours".

T a b l e 6

Influence of Selected Factors on the Conditional Variable

Motivation	Completely agree	Sig.	Agree	Sig.	Neutral	Sig.	Disagree	Sig.	Completely disagree
Holiday	0.46	***	0.34	***	**0.44**	***	0.41	**	0.18
VFR	0.36	**	0.21		0.28	**	0.38	*	0.19
Leisure	0.38	***	0.25	**	**0.55**	*	0.24		0.33
Business	**0.64**	***	0.35	***	0.28	**	0.20		0.47
Destination									
Brno	0.45	***	0.25	***	0.27	**	0.26		0.19
Praha	**0.63**	***	0.31	***	0.41	***	0.48	***	0.26
Ostrava	0.32		0.30	***	0.40	***	0.35		0.43
Origin									
HSR_NO	0.38	***	0.23	***	0.27	***	0.27	**	0.22
HSR_YES	**0.65**	***	0.41	***	0.46	***	0.47	**	–
Travel companion									
With partner	0.55	***	0.33	***	0.39	***	0.39	*	0.30
With friends	0.24		0.16		0.43	***	0.30		0.37
With colleagues	0.62	***	0.24		0.30		0.28		0.38
Alone	0.54	***	0.36	***	0.25	*	0.39	*	0.63
With family	0.37	**	0.30	**	0.45	***	0.47	**	0.40
Time spent on a journey									
more than 4 hours	0.56	***	0.36	***	0.46	***	**0.58**	***	0.65
121 min – 4 hours	0.49	***	0.23	**	0.27	***	0.30	*	0.35
61 – 120 min	0.28		0.28	**	0.26	*	0.27		0.38
31 – 60 min	0.34		0.31		0.36	*	0.21		0.49
Up to 30 min	0.60		0.37		0.38		0.47		0.47
Total	**0.45**		**0.26**		**0.29**		**0.27**		**0.20**

Source: Authors' calculation.

Business

Business visitors are more resistant to the positive effects of the conditional variable. There is a positivity of environmental attitudes on the willingness to use HSR (agree; 13.162). However, in comparison to the segment of Praha visitors it is lower. Car users have a dominant influence on the results because they are the cause of the resistance. Concerning the business segment, there are not any significant positive changes across the individual statements to the environmental attitude (e.g., in the case of "agree" attitudes, the increase is 5 pp, but it is not statistically significant at the level of 0.95; p = 0.198). Train users show higher willingness to HSR only in case of "agree" attitudes towards environmentally friendly transport. The "neutral" attitude causes the reduction of willingness to use HSR. The analysis of opportunities to switch from one mode of transport to another one verifies the results. Only the "agree" statement (of willingness to pay more for transport if his would help the environment) proves higher willingness to switch to HSR at train user rather than at car ones (see Table 6).

Holiday

There is a similarity between the preferences of the segment of holiday visitors (i.e., long-stay visitors) and the character behaviour of the whole research sample identified above. Train users are more willing to use HSR and moreover the "agree" statement about environmentally friendly transport increase the dependence ("Completely agree" attitude rise about 8.4 pp, p = 0.016). In comparison to car users of Business segment, there is obvious tendency to use HSR that grows with the positive environmental attitude (however the attitude is not statistically significant). It is the "neutral" statement that highlights differences in willingness to use HSR at train users and car ones. These results correspond to the analysis of opportunities. The highest probability to use HSR by train users rather than car ones comes out the "neutral" statement to environment attitudes.

Leisure

The "leisure" segment is to some extent specific because the positive environmental attitudes do not lead to a higher willingness to use HSR. This was confirmed by both car users and train ones (HSR preferences do not change in the case of positive attitudes). The train is not a typical mode of transport for this target group. Visitors from "leisure" segment more often use the car to get to selected cities (Praha, Brno, Ostrava). Only "neutral" attitudes towards environmentally friendly transport increase the probability of using HSR. This is more significant for train users (about 16 pp, p = 0.032) rather than for car ones (about 4 pp, p = 0.311). This finding verifies the analysis of odds ratio (see Table 7).

The above stated knowledge helps to answer the third research question – RQ3: Are there types of travel motivations that, despite a positive attitude towards environmental issues, will strengthen the willingness to use HSR by train or car users? The research question is confirmed. The results verify the existence of such motives however, they differ. For holiday and business segment, they are mainly train users. Car users tend to stay with the already used mode of transport. In the case of the leisure segment, even a positive attitude towards environmentally friendly transport does not lead to a strengthening of the willingness to use HSR.

Origin and Experience with HSR

Concerning the experience of visitors with HSR there is an apparent relation between the choice of modes of transport, the willingness to use HSR and the attitude towards environmentally friendly transport. The half of the segment travel by train and moreover there is 89.6% willingness to use HSR. Concerning the conditional variable (specifically the "completely agree" attitude towards environmentally

friendly transport), the relation strengthens. In this segment, the train is preferred by 75% of visitors from Austria and Germany, and all of them show the willingness to use HRS.

On the contrary, 30% of visitors choose the car as their mode of transport, and only 1/4 of them are willing to use HSR. The results show 11% of car users that have very positive attitude towards environmentally friendly transport and one-fourth of them prefers HSR. So, there is no change.

In general, the "agree" statement (positive attitude) towards the environment issues increases the difference in willingness to use HSR between car users and train users. The reason is obvious. Train users have higher willingness to use HSR and at the same time car users refuse to switch to HSR. However, it is not statistically significant (p = 0.145). The country of origin and the existence of HSR influence the attitudes of the use of HSR when traveling to the examined cities (RQ5).

The Phenomenon of Praha

Visitors of Praha differ in their attitudes from visitors of Brno or Ostrava. A positive attitude towards environmentally friendly transport leads to stronger willingness to use HSR, both for train and car users. In the case of train users, the effect shows the "neutral" attitude towards environmentally friendly transport as well however, it is not statistically significant (p = 0.091). Concerning car users, the "neutral" statement about environmentally friendly transport causes the tendency to reject the using of HSR. In the case of train users, the conditional variable does not influence the willingness to use HSR because the preference is obvious. The willingness to use HSR by train users is almost absolute (99% for the "completely agree" statement about environmentally friendly transport).

Nevertheless, the dominance of the HSR's general preference for train users does not outweigh the positive attitude (towards environmentally friendly transport) of car users to switch from car to HSR. The analysis of opportunities reveals in the case of Praha that there is up to 15 times, respectively 18 times probability to switch from train to HSR comparing to car users. The character of the destination affects attitudes towards environmentally friendly transport and furthermore it affects the willingness to use HSR (RQ6).

Travel Time

The time spent on the journey is the last variable that affects the importance of the conditional variable. For very long journeys ("more than 4 hours"), it turns out that in the case of train users, the willingness to use HSR is independent on the attitude towards environmentally friendly transport. In general, the willingness to use HSR is very high for all statements of attitudes towards environmentally

friendly transport. The results are not clear for car users. For positive environmental attitudes ("agree" statements), the willingness to use HSR is growing 10.1 pp. However, the growth is not statistically significant (p = 0.089). Concerning "neutral" attitude towards environmentally friendly transport the willingness to switch to HSR unchanged. Comparing train and car users there is a crucial difference in the probability to use HSR. The probability to switch from train to HSR is up to 70 times higher for train user than for car ones (Table 7).

T a b l e 7
Odds Ratio – the Likelihood of Switching to HSR in Relation to Environmentally Friendly Transport (Train versus Car Users)

Odds for train users	**Attitude towards environmentally friendly transport**					
Variable	*"Completely agree" and "agree"*	*Sig.*	*"Neutral"*	*Sig.*	*"Disagree" and "completely disagree"*	*Sig.*
VFR	4.62	***	4.57	**	9.97	***
Holiday	18.07	***	20.30	***	7.88	***
Leisure	4.60	***	33.85	***	4.33	***
Business	13.16	***	2.35		1.67	
Praha	14.8	***	17.85	***	8.75	***
Brno	6.56	***	1.28		1.73	
Ostrava	6.60	***	9.17	***	7.03	***
HSR_Yes	32.15	***	8.53	***	21.38	
HSR_No	6.70	***	5.27	***	3.51	***
more than 4 hours	76.45	***	66.6	***	59.50	
121 min – 4 hours	9.98	***	3.62	***	2.65	*
61 – 120 min	2.61	*	5.83	***	2.55	
31 – 60 min	6.30	***	3.94		6.00	*
Up to 30 min	0.08	*	0.50		0.50	
Total	9.68	***	5.71	***	4.40	***

Source: Authors' calculation.

4. Discussion

The paper examined the role of previous experience with the used mode of transport and its relations to willingness to use HSR in the future. Similarly, it examined how respondents' attitudes (especially towards environmental issues) affect these links and whether these attitudes relate to other variables such as respondent characteristics, motivation, origin or type of destination and time spent on the trip.

Positive attitudes to the future use of HSR are shown mainly by visitors from more distant places of their origin. The length of the journey to the destination therefore affects the choice of HSR. It is a traditional factor mentioned in a number of studies (e.g., Gutiérrez et al., 2019; Romão and Bi, 2021; Park and Zhong, 2022).

This positive attitude to the future use of HSR is further strengthened if the visitors come from countries in which HSR is a part of their transport system (i.e., Austria, Germany). Travel motivations significantly differentiate attitudes towards the use of HSR (i.e., Yum, 2020); especially "white collar" visitors for business meetings have positive attitudes to the use of HSR. These findings are consistent with the importance of another variable, which is a companion on the journey. Visitors with colleagues (i.e., during the business trips) have above-average positive attitude to the use of HSR.

The importance of destinations and their character is also proven; specifically, the importance of Praha as a business and cultural centre of the Czech Republic, resp. metropolises heavily involved in global trade ties. In addition to business trips, Austrian and German visitors of Praha for a purpose of sightseeing show an above-average willingness to use HSR. In principle, these segments do not strongly perceive the potential price barrier for the use of HSR services. Price is, however, another key factor (Hergesell and Dickinger, 2013). For example, students, resp. younger sections of the population often cite price as a major barrier. Although age has not been identified as a factor that differentiates attitudes towards the use of HSR, even in our data younger visitors do not have a very positive attitude towards the use of HSR (in contrast with Martín et al., 2019).

User experience with the similar mode of transport turn out to be the main differentiating factor in attitudes to the future use of transport. Visitors who arrived at the destinations by train clearly prefer the HSR. The odds of choosing HSR for train users are many times greater (9.68) than for car users. Car users usually express negative attitudes toward HSR. What is behind these findings? It can be concluded that train users have a different value profile, which to a greater extent includes stronger environmental attitudes. But there are other factors as well. Above all, it is the absence of barriers to the intermodal shift from the car to the train. Current train users do not deal with or are settled by a whole series of obstacles (Blainey et al., 2012). These include structural or conscious car dependency (Gray et al., 2001), convenience and flexibility of the car, crowding and the presence of other people (Currie and Rose, 2008) or the image of public transport (Blainey et al., 2012).

On the other hand, car preference has its justifications. Another alternative is not often suitable as these journeys by car are often associated with the transport of larger loads or luggage (Currie and Rose, 2008), multidestination trips and problems with transfers or short journeys, which are not supported by a sufficient density of railway infrastructure. Indirect support of employee benefits in the form of company cars also plays an important role (Gray et al., 2001). Thøgersen (2006) also draws attention to the influence of past experience on travel modes on future

travel behaviour. In this context, the reliance on a car can be a significant barrier to modal shift (Gray et al., 2001).

Environmental attitudes are a key conditional variable that increases the likelihood of choosing an HSR. HSR is not only (traditionally) perceived as fast, reliable, and comfortable mode of transport (Givoni, 2006), but also as an ecological mode of transport. HSR represents a gentle alternative to individual transport, especially automobile or air (Krishnan et al., 2015).

However, positive attitudes towards environmentally friendly transport are semantically differentiated. Train users logically tend to use HSR which is supported by a strong correlation. This relationship is further strengthened by a possible positive attitude towards environmentally friendly transport. Even for car users, positive environmental attitudes increase preference for HSR. However, many of them would not use HSR. The support of HSR is significantly determined by the already acquired habits and the current patterns of mobility behaviour (Harvey et al., 2014). At the same time, for the potential positive impacts of HSR on the environment, the modal shift from cars or planes is required.

Conclusions

Our research shows that despite the new quality of HSR in the transport system (time savings, comfort, connection frequency), this shift is more than problematic. Especially travels for shorter distances, business trips, or trips with the family are often associated with logical barriers that prevent the use of HSR. Advanced methods such as cluster analysis or entropy methods could provide a nuanced understanding of the existing findings. These methods would offer insights into the factors hindering HSR adoption and predicting cycles of uncertainty in temporary transport decision-making on tourist-oriented journeys.

As attitudes could become a trigger for further action, future research should focus on the willingness of passengers to sacrifice their benefits in exchange for the real or perceived environmental gains of the transport mode used. The area of inter-modal transfer of passengers from aircraft to more environmentally friendly modes of transport appears to be another promising direction for research. In this context, the relationship between the tourism industry, air transport, and consumers can be explored, as well as the mechanisms through which low-cost air transport has become embedded in the tourism and transport behaviour of tourism participants.

At a practical level, it is possible to consider, on the one hand, environmental education and influencing the value framework of the population to increase its environmental sensitivity and, on the other hand, to use social marketing concepts and apply attitude characteristics in favour of influencing mobility behaviour

patterns. In line with Prillwitz and Barr (2011), complex measures such as personal carbon budgeting or quantification of the carbon footprint, which covers various areas of everyday life, can also be considered.

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