

Future tourism development based on the knowledge of preferential choice of HSR

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Abstract

The paper contributes to the extensive knowledge on the impacts of high-speed transport systems on transport-related human behaviour. The paper presents the case of the Czech Republic – a small transit country in Central Europe where the government plans to build high-speed transport systems to improve transport connectivity within Europe. This step will certainly be met with a response. So, the aim of the paper is to find out how high-speed rail (HSR) influences tourism development in the Czech Republic. Therefore, the paper focuses on behaviour of travellers and analyses its intention to switch from a certain mode of transport to HSR. In order to predict future tourism development, determinants of transport mode choice are analysed and tested to learn more about travellers' preferences and their potential change in their behaviour. The findings reveal that HSR would stimulate international tourism and for certain circumstances it would help to recover MICE tourism.

Keywords

HSR, determinants of transport mode choice, travellers' preferences, tourism development

JEL classification: L83, L92, R41

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Introduction

In terms of transportation, the Czech Republic has a strategic geographical position in Central Europe. It is considered as a transit country. However, the transport infrastructure is not sufficient. Though the density of rails is high, there are no high-speed rails (HSR) in the Czech Republic. The current rails do not enable the speed of 250 km/h or more. Even the modernisation of the rail system did not help with reaching such speed limits. Therefore, the Czech Ministry of Transportation issued the Programme for HSR development (2017) with the mission to build a new high-speed rail that would connect Germany in the West, Austria in the South, Slovakia in the East, and Poland in the North. This intention is strongly supported by the strategic political priority at the EU level.

Besides connectivity, HSR is often discussed in the context of sustainability. Generally, HSR is labelled as a “green” mode of transport (Barr & Prillwitz, 2012; Le-Klähn, Gerike, & Hall, 2014; Albaete & Bel, 2017; Gross & Grimm, 2018) because it has the lowest carbon footprint worldwide (statista.com, 2018). Nevertheless, it should be highlighted as well that building and maintaining HRS is so financially demanding that the environmental benefits could not compensate for the costs (Lochman, 2014). Therefore, each government faces at least two questions 1) whether HSR will be efficient, and 2) in what terms it improves the regional economy. The travellers’ behaviour and their potential preferences to choose HSR can provide answers to the above stated questions.

The aim of the paper is to find out whether the potential HSR will influence tourism in the Czech Republic (as a part of the regional economy). If yes, in what way?

Theoretical basis

The research is based on the theory of planned behaviour that studies determinants of transport choice. Ajzen (1991) identifies three independent determinants: attitudes, subjective norms, and perceived behavioural control. A different perspective is introduced by Dann (1999) who distinguished “push” factors of transport choice (characteristics of respondents), and “pull” factors that characterised the mode of transport. Going more into detail, Holubová (2022) categorizes the pull factors into technical factors, internal (emotional) factors and external factors of the mode of transport (see Figure 1). Technical factors are closely connected with the technical parameters of each mode of transport. Internal factors are related to emotional perceptions of the mode of transport. And finally, external factors are determined by local conditions.

Figure 1 Factors/characteristics of the mode of transport (Source: Holubová, 2022)

Technical factors	Internal (emotional) factors	External factors
<ul style="list-style-type: none"> • Speed • Price • Frequency • Reliability • Flexible time of departure • Safety • Work on journey • Service on journey 	<ul style="list-style-type: none"> • Comfort • Reluctant to drive for a long distance • Tradition of the mode of transport in family • Comfort for travelling with children • Comfort for travelling with oversized luggage • Intimacy 	<ul style="list-style-type: none"> • Accessibility destination from station • Environmental friendly transport • Time spent parking

The knowledge of factors that determine travellers' choice is essential for the model shift. It studies the intention of travellers to switch to public transport, mainly to train (Dickinson, Robbins, & Fletcher, 2009; Le-Klähn, Gerike, & Hall, 2014). Besides the factors related to the characteristics of the mode of transport, such as “ease of use,” or being “trouble-free” (Borhan, Ibrahim, & Miskeen, 2019), there are other determinants.

The intention of travellers to use a train can be influenced by the offer of a new product (e.g., a new multi-modal ticket - Lumsdon, Downward, & Rhoden, 2006) that is integrated and designated as well (Nordlund & Wistin, 2013). Another important determinant that stimulates a willingness to switch is marketing, precisely information providing (Le-Klähn, Gerike, & Hall, 2014). Concerning destination marketing even the nature of the destination can make travellers change their preferences in the mode of transport (Dickinson, Robbins, & Fletcher, 2009). Moreover, it was found that the shift can be caused by the awareness of environmental aspects (Barr & Prillwitz, 2012).

Methodology

To give an answer on whether the potential HSR will influence tourism in the Czech Republic it is essential to test the probability of switching from a different mode of transport to HSR. Another step is to determinate what factors (push or pull, see Dann, 1999) make tourist-travellers choose a certain mode of transport, namely train (HSR). Finally, on the basis of tourist-travellers' behaviour, the potential future tourism development in the Czech Republic is identified.

Data was collected by face-to-face interviewing that was carried out from July to October 2019. The research was conducted as part of the long-term inter-sectoral project called “New Mobility – High-Speed Transport Systems and Transport-Related Human Behaviour.” One of the research topics is “The potential for high-speed transport in tourism.” The interviewing took place in three cities (Prague, Brno, and Ostrava) that are planned as the major nodes of the potential HSR system in the Czech Republic. Quantitative research based on the importance of the nodes in the Czech transport

system and on the plan for the construction of HSR (Quota: Prague=800, Brno=600, and Ostrava=400) was quoted. The quota dependably reflects the importance of tourism activities in these destinations.

Data sample

The object of the research is a traveller who fits the definition of tourism in terms of the length of his/her stay and the purpose of travelling, i.e., one-day traveller, tourist, business trips, visitor of relatives, and transits. Another criterium for the sample was the mode of transport. For the research, car, bus and train were relevant. Those respondents who forgot to indicate their mode of transport or used a different type were excluded. Thus, the total sample contains 1,641 respondents (see Table 1).

Table 1 Data sample (Source: authors, 2022)

Characteristics of respondents	Count	Percentage
Gender (#18)		
Male	803	48.9
Female	836	50.9
Without gender	2	0.1
Age (#19)		
15-19	38	2.3
20-34	613	37.4
35-44	474	28.9
45-54	242	14.7
55-64	173	10.5
65+	80	4.9
Without age	21	1.3
Place of residence (#2)		
Czech Republic	858	52.3
Austria	189	11.5
Germany	198	12.1
Poland	168	10.2
Slovakia	181	11.0
Others	47	2.9
Purpose of travel (#1)		
Business trip	446	27.2
One-day leisure trip	311	19.0
Overnight stay	452	27.5
Visit of relatives	361	22.0
Transit	71	4.3
Means of transport (#5)		
Car	699	42.6
Bus	124	7.6
Train	818	49.8

The data sample provides gender equality. From tourism perspectives, the sample consists of 858 domestic (Czech) tourist-travellers and 783 foreign tourist-travellers. All age categories are covered. Concerning the place of residence, the sample includes all important countries on the potential HSR corridors.

Methods

Date was tested based on the mode of transport. Descriptive statistics helped to analyse both the absolute and relative frequency of respondents' characteristics and their willingness to use HSR. Thus, the potential (switch to HSR) change in travellers' behaviour was identified.

The research tested "pull" factors that characterised each mode of transport. They were categorised according Holubová (2022). Respondents were asked to evaluate each of them. The evaluation statements were put into the Likert scale from "completely (slightly) important" via "neutral" to "completely (slightly) unimportant." The responses "do not know" were ignored. To determine preferred factors of transport choice, their average and variability were analysed.

To express travellers' preferences the comparison among the factors of each mode of transport (parametric data) was checked for statistical significance using the ANOVA test and the multiple comparison post hoc test. Based on these findings and with respect to the global situation (e.g., COVID-19, Green Deal, etc.) the contextual model of the influence of HSR on tourism in the Czech Republic was extrapolated.

Results

Switching to HSR

A willingness to use HSR instead of other means of transport was tested in the context of time savings. Time savings would make half of all respondents (see Table 2) change their choice and they would prefer HSR to the other modes of transport. One third of travellers would not switch to HSR anyway. However, there is a hidden potential in 16.9% of respondents who did not yet know whether they would use HSR.

Table 2 Willingness to use HSR (Source: authors, 2022)

	Willingness	Agree	%	Disagree	%	Not know	%
Total		886	54.0	478	29.1	277	16.9
Transport modes							
Car		214	30.6	327	46.8	158	22.6
Bus		61	49.2	28	22.6	35	28.2
Train		611	74.7	123	15.0	84	10.3
Place of residence							
Czech Republic		471	54.9	260	30.3	127	14.8
Austria		140	74.1	37	19.6	12	6.3
Germany		110	55.6	60	30.3	28	14.1
Poland		53	31.6	75	44.6	40	23.8
Slovakia		86	47.5	33	18.2	62	34.3
Others		26	55.3	13	27.7	8	17.0
Purpose of travel							
Business trip		258	57.8	124	27.8	64	14.3
One-day leisure trip		140	45.0	108	34.7	63	20.3
Overnight stay		268	59.3	131	29.0	53	11.7
Visit of relatives		173	47.9	103	28.5	85	23.5
Transit		47	66.2	12	16.9	12	16.9

The research discovered that the most willing to switch to HSR are the users who prefer *train* for their travelling in tourism, and their purpose of travel is either *business trip* or *overnight stay*. Foreigners dominate among train-users who would prefer HSR, mainly travellers from *Austria*. *Transit* travellers also exhibited a high probability to use HSR (66.2%).

Concerning bus-users, there is positive potential (49.2%) to change their mode of transport to HSR as well. Czechs are typical bus-users. Therefore, there is potential demand for HSR in domestic tourism. On the other hand, car-users expressed that their preference for travel by car would probably not change. The explanation is in the purpose of their travelling – *overnight stay*. Most of the disagree statements come from Czech and Polish travellers. The results show that the youngest generation (15-19) and travellers in the age of 45-54 are more likely determined to use HSR.

Factors influencing the choice of the mode of transport

From a descriptive statistics perspective, technical factors demonstrate more objective evaluation contrary to the internal and external category of factors. These factors are considered more personal (subjective). There is evidence that technical factors do not show significant differences in evaluation across age groups, gender, or place of residence. However, the evaluation of external, and internal factors varies. For example, the factor *comfort* shows that female concern train as the most comfortable mode of transport, whereas male prefer car.

The analysis of the averages (μ) and variability (σ) of each factor (see Table 3) and their comparison provide interesting results.

Table 3 Evaluation of factors (Source: authors, 2022)

Transport mode factors	Car (n=664)		Bus (n=122)		Train (n=804)	
	μ	σ	μ	σ	μ	σ
Technical factors						
Speed	1.620	0.854	1.926	0.970	1.827	0.845
Price	2.334	1.790	1.694	0.890	1.858	1.155
Frequency	-	-	1.926	0.970	1.885	0.966
Reliability	1.686	0.889	1.746	0.845	1.798	0.809
Flexible time of departure	1.468	0.698	2.041	1.048	1.990	0.953
Safety	2.065	1.514	2.075	1.269	1.916	1.222
Work on journey	3.088	2.317	3.391	2.272	2.571	2.048
Service on journey	-	-	3.132	2.379	2.252	1.595
Internal factors						
Comfort	1.646	0.842	1.943	0.906	1.746	0.834
Reluctant to drive for a long distance	-	-	3.096	2.210	2.538	1.850
Tradition of the mode of transport in family	2.825	2.191	3.774	1.844	3.359	2.079
Comfort for travelling with children	3.084	2.596	3.704	1.686	3.469	2.309
Comfort for travelling with oversized luggage	2.426	2.116	3.108	1.780	2.468	1.993
Intimacy	1.666	1.140	-	-	-	-
External factors						
Accessibility of destination from station	-	-	2.067	1.162	2.079	1.812
Environmentally friendly	-	-	2.487	1.363	2.312	1.790
Time spent parking	2.498	1.708	-	-	-	-

For car-users, the most important factor is *flexible time of departure* ($\mu=1.468$). Its variability is the lowest ($\sigma=0.698$) and at the same time it is the biggest advantage of that mode of transport. Other factors that motivate travellers to choose a car are *speed*, *comfort*, *intimacy*, and *reliability*. On the other hand, disadvantages in comparison to other modes of transport are *price*, and *time spent parking*.

Those who travelled by bus consider *price* as the most completely important factor ($\mu=1.694$) for their decision. According to the results, the bus is the best price mode of transport in general.

Train-users highly evaluate *safety* ($\mu=1.916$) contrary to car and bus-users' choice. Factors of *reliability* ($\sigma=0.809$) and *comfort* ($\sigma=0.834$) show a low variability of all factors even across the modes of transport. Although the factors of *work on journey* and *service on journey* do not dominate in travellers' choice, in the future they might be an advantage for trains and potentially HSR in comparison to other modes of transport.

In general, factors, such as *reluctance to drive a long distance*, *tradition of the mode of transport in the family*, *comfort for travelling with children*, and *comfort for travelling with oversized luggage*, show high variability. Thus, these factors are irrelevant for the process of choosing a certain mode of transport in this research.

From a statistical point of view, the most significant factor is *reliability* ($p=0.0665540$). The ANOVA test reveals that it is the only factor independent of the chosen mode of transport (see Table 4). Concerning multiple comparisons the most significant preferential factors of train (resp. HSR) are *price* and *safety* in comparison to car – the mode of transport.

Table 4 (In)dependence of transport mode factors (Source: authors, 2022)

Transport mode factors	ANOVA	
	p	$\alpha=0.05$
Technical factors		
Speed	0.0000112	$p < \alpha$
Price	7.77156E-16	$p < \alpha$
Reliability	0.0665540	$p > \alpha$
Flexible time of departure	0.0	$p < \alpha$
Safety	0.0383562	$p < \alpha$
Work on journey	9.88098E-14	$p < \alpha$
Internal factors		
Comfort	0.0027319	$p < \alpha$
Tradition of the mode of transport in family	2.10942E-15	$p < \alpha$
Comfort for travelling with children	0.0000005	$p < \alpha$
Comfort for travelling with oversized luggage	0.0000067	$p < \alpha$

Discussion and conclusion

In the Czech Republic, high-speed rail (HSR) does not yet exist, so the research presents hypothetical intentions to use HSR. Generally, the results did not demonstrate new findings in terms of factors to determine the choice of transport mode. However, the contribution of the paper lies in the knowledge about travellers' behaviour that can be applied in future destination management (and marketing) planning.

The data shows that there is evident willingness for switching to HSR (54.0% plus 16.9% of respondents who hesitate) which is motivated by savings of time on a journey. The group of hesitating respondents opens possibilities for further studies. It would be interesting to test how the application of a certain integrated and dedicated product/offer (see Lumsdon, Downward, & Rhoden, 2006; Nordlund & Wistin, 2013) would change their opinion.

Generally, HSR improves the connectivity of destinations. Therefore, there is a definite possibility that HSR would attract travellers from foreign countries to come to the Czech Republic. The research revealed that HSR would be used by international tourists, namely those who transit and those who come from Austria (74.1%) – the southern corridor. However, domestic tourism would be encouraged as well. Such knowledge of travellers' behaviour can improve strategic planning of tourism development in destinations. For example, Prague City Tourism, the Central Bohemia Tourist Board, Tourist Authority South Moravia, and Brno Region as local/regional tourism authorities can take advantage of the knowledge in their destination marketing (see Le-Klähn, Gerike, & Hall, 2014; Dickinson, Robbins, & Fletcher, 2009). The key word for marketing should be “safety” and “price” as the major preference factors of trains. In comparison to cars, the “price” should be associated with both economic and environmental aspect of HSR. The former should be put into the context of reasonability, and the latter should be highlighted in the context of sustainability.

Concerning the purpose of travelling, there is underutilized potential in travellers on their business trips who use train as their main mode of transport. Thus, in the post-covid period, HSR offers a great opportunity to recover MICE tourism in the Czech Republic. Moreover, HSR can support another global trend, such as sustainable tourism and the priority of the EU to reduce carbon dioxide.

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