

Optimising public transport to increase tourist flows

Tomas Burda¹, Veronika Zidova², Tetiana But³

¹ University of Hradec Kralove, Faculty of Informatics and Management, Department of Recreation and Tourism, Czech Republic, ORCID: 0000-0001-8441-4056, tomas.burda.2@uhk.cz;

² University of Hradec Kralove, Faculty of Informatics and Management, Department of Recreation and Tourism, Czech Republic, ORCID: 0000-0002-3571-0956, veronika.zidova@uhk.cz (corresponding author);

³ University of Hradec Kralove, Faculty of Informatics and Management, Department of Recreation and Tourism, Czech Republic, ORCID: 0000-0001-9403-4698, tetiana.but@uhk.cz.

Abstract: The paper proposes ways to optimise public transport in order to increase tourist flows to four well-known tourist destinations in the Czech Republic, namely Český Krumlov, Jánské Lázně, Lednice and Macocha, during the spring and autumn seasons. It was found that the quality of public transport infrastructure needed to be improved if tourist flows were to increase. It has been found that tourism development is entirely dependent on the quality of transport infrastructure in order to achieve an increase in tourist flows. A long-term marketing study was carried out in the destinations above with the aim of gathering data on the number of tourists in each of them, the availability of public transport and its timetables, and the needs of tourists in order to improve public transport service. Research has shown that most tourists use secondary transport. This is due to convenience, lack of time, increased comfort, personal requirements and lack of provision of public transport. In addition, there are problems with rail service to some tourist destinations, and the intensity of the bus network varies, which is not convenient for tourists from different population groups. It was found that the capacity of the bus service to the selected destinations is sufficient and can positively influence the growth of tourist flows without increasing logistics costs just by changing the organisation of public transport. Based on the competitive advantage analysis results for the four destinations studied, the weaknesses and strengths of rail and bus transports were identified. Most tourists report that rail transport is more convenient mainly because of its well-connected transport service and affordable prices compared to aeroplanes or cars. It was found that the number of passengers is influenced by the geographic component of the terrain; two destinations (Jánské Lázně and Macocha) are located in the mountains and have a limited infrastructure network due to the undulating terrain, and thus not all means of public transport reach these destinations. It is verified that Český Krumlov is the most optimal of the destinations studied. The study revealed a relationship between the quality of transport infrastructure and the increase in tourist flows to the tourist destinations studied. We propose to develop a model to optimise the transport service in cooperation with a network of tourist information centres. To refine it, further surveys need to be carried out in different directions during the summer and winter seasons.

Keywords: Tourism, public transport, economy, destinations.

JEL Classification: R42, Z39.

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Introduction

Transport is one of the key conditions for the realisation of tourism. Without a high-quality transport infrastructure, the accessibility of even the most important tourist attractions is very problematic. As a result, transport accessibility fundamentally influences the visitation rate of tourist destinations. The main role is played not only by transport to the destination itself (mainly air, road and rail transport, in the case of cruises also shipping) but also by transport in the destination (local and urban transport and possibly also specific modes of transport such as cable car). The Czech Republic has a relatively dense and high-quality public transport network. However, it is mainly aimed at providing basic needs, such as commuting to work, schools and services. For this reason, its main routes and frequency (the highest during the working week and reduced during school holidays) do not match the needs of tourism participants. This is particularly true for public transport outside the main routes. The share of the tourism segment in international transport is higher, mainly due to air and rail transport, which reflects the needs of tourists more. The Central Bohemian Region is an example of a region that also provides, albeit to a limited extent, services for secondary transport, but without a specific focus. In contrast, the South Moravian Region focuses on selected tourist destinations (Lednice, Macocha) in addition to general service, which can be considered the best solution in the conditions of the Czech Republic. Mountain areas are equipped with cable cars or a network of intra-regional bus services. However, they often do not have a good service to the arrival to/departure from the destination (Šumava Mountains). A separate question is the difference between bus and rail service.

The aim of the article is to show the relationship between the intensity of public transport and the increase in traffic to selected tourist destinations on the example of Český Krumlov, Jánské Lázně, Lednice and Macocha. A long-term marketing study was carried out in order to optimise traffic for increasing tourist flows on four well-known tourist routes of the Czech Republic: Český Krumlov, Jánské Lázně, Lednice and Macocha. The aim of the study was to collect data on the number of tourists in each direction, the availability of transport and timetables, and the wishes of tourists to improve transport services in selected

areas. The data for the study were collected over a period of 3 years (2020–2022) through interviews with tourists travelling in the relevant transport directions.

The analysis carried out is the starting point for the whole further traffic management because it is not possible to plan transport services well if we do not know the quantity, timing and routes of potential users' journeys.

1. Theoretical background

The issues of optimising traffic flows and increasing the number of tourists, which have a significant impact on the development of the country and worldwide, have been repeatedly addressed by scientists. The accessibility of tourism as one of the problems of tourism development, which is attracting increasing academic attention due to global demographic changes associated with a sharp increase in disability and an ageing population, was studied by Sakalauskaite et al. (2020).

Winston (1985) gives an overview of the choice of optimal transport provision, which is crucial for attracting tourists to the regions. The lack of knowledge about the definition of potential transit destinations along European transport corridors and the quality of hotel services is explored by Iliev (2021). Passenger transport, as an important part of long-distance travel using multimodal solutions, and as a factor in increasing transport accessibility and maintaining profitability, was addressed by Malysz (2021). The dependence of sustainable tourism development on the importance attached to transport services in public, business planning and policy was addressed by Le-Klähn et al. (2014). Promoting changes in tourists' travel behaviour through an innovative smartphone application for public transport planning to increase the attractiveness of public transport was addressed by Maas et al. (2021). Tiranani et al. (2019) investigated the matching of demand for logistics potential and supply chains in the tourism industry for accessing tourist facilities that provide ample parking, public transportation, presence of signs, symbols, road markings, and danger signs for easy access to tourist destinations. The role of public transport in rural tourism as an important part of providing access for tourists to and within destinations was discussed by Dileep and Pagliara (2023). The assessment of transport accessibility in rural tourism was addressed

by Zolotarev et al. (2023). The problems of travel restrictions resulting from the COVID-19 pandemic and the identification of foreign travellers' social preferences for transport as a priority travel choice were addressed by Pozdnyakova et al. (2023). Uršič (2022) examined the advantages and disadvantages of using car transport in tourism. Troshin et al. (2022) present the specifics of the most important principles for the development of regional tourism potential as one of the main conditions for the spatial development of individual regions and their infrastructure, including the currently pressing pandemic risk. Studies of the spatial spillover effects of infrastructure improvements on regional tourism growth were presented in Fengjun et al. (2022). Haçia et al. (2023) presented the results of a study of urban logistics in urban tourism as a research area in the decarbonisation era, examining research gaps and identifying dominant linkages between tourism, logistics, urban transport, development and planning. There are also review articles on transport and tourism that discuss the increase in tourist flows (Pulina et al., 2020).

However, the need to increase the intensity of public transport in order to increase tourist flows in the European countries, especially in the Czech Republic, is not sufficiently explored.

Search engines such as JSTOR, Econlit, Scencedirect, Google Scholar, as well as search engines of foreign publishers, were used to gather secondary information on the subject. Furthermore, the content of all issues of more than 40 journals with transport-, geography- and logistics-related topics was analysed.

Research methods: statistical and extrapolation methods were used to process primary information obtained in the marketing research on the composition and structure of tourist flows on four well-known tourist routes in the Czech Republic: Český Krumlov, Jánské Lázně, Lednice and Macocha. An expert method of collecting primary information and processing secondary information collected from search engines, such as JSTOR, Econlit, Scencedirect, Google Scholar and domestic and foreign publishers on transport, geography and logistics was used. A modelling method using transport-related issues was used to determine and predict the increase in tourist flows resulting from the optimisation of transport services.

2. Research methodology

For most tourists, the gateway to the Czech Republic is Václav Havel Airport in Prague-Ruzyně. It handles 95% of those who use air transport (in 2019, the last year before the pandemic, it handled almost 18 million passengers) (Prg.areo.cz, 2021). Like most international bus and rail transport lines, it heads to Prague, which is the destination of about 70% of all foreign tourists, and possibly to other major centres (Brno, Olomouc, Ostrava).

Only a minor part of the transport networks and public transport serves primarily tourism. This is the case in tourist attraction areas, which are, however, only partially integrated into the transport systems of individual regions. Transport networks are often privately owned and are also classified as technical heritage. Examples are narrow-gauge railways (Jindřichův Hradec-Nová Bystřice in the area of Česká Kanada Natural Park, Třemošná-Osoblahy in the Moravia-Silesia Region or the "Posázavský Pacifik" (Sazava Pacific Railroad) between Čerčany and Ledec nad Sázavou), mountain scenic routes (e.g., in the Giant Mountains), water transport (on the Vltava River from Prague down to Slapy Water Reservoir and on other reservoirs, such as Lipno, Orlík and Štěchovice) or cycle buses and cycle trains in the Krkonoše (Giant Mountains), Orlické hory (Eagle Mountains) and Šumava (Bohemian Forest). A specific case are railways operated as tourist attractions ("Švestková dráha" or Plum Railway in the České středohoří (Czech Central Highlands), and the museum railway Velké Březno-Zubrnice). Most of the lines operated in this way only have weekend or holiday operation. As a result, at least limited traffic has been maintained in depopulating country areas. Also, these modes of transport were integrated into the transport service system.

Most tourist destinations in the Czech Republic are located off the main transport routes and are not connected to the main transport routes. They are mainly located in border and peripheral areas. This is not specific to the Czech Republic alone but is accentuated by specific social and historical developments and natural conditions. For example, all four national parks are located close to the national borders. The same applies to more than half of all protected areas. Out of the 16 UNESCO World Heritage sites, 12 are located outside regional centres. The situation is similar for

other outstanding monuments (Norros, 2018). Many of these tourist destinations are located in the inner peripheries close to the historical Czech-Moravian border or the relict Czech-German ethnic border, as well as close to the current regional borders. In such cases, general public transport problems are exacerbated by poor coordination of transport services across these borders (Burda, 2014).

For this reason, the number of passengers using individual transport is increasing. This is, however, associated with higher, undesirable externalities (increased demands on the transport network, environmental burden, especially in protected areas, the need for car parks and additional infrastructure). External costs are usually higher for this mode of transport, which reinforces the need to switch from individual to public transport. Public transport costs are incurred in absolute terms at a much lower rate than in individual transport and, on a per-passenger basis, they are also lower. The largest part of the external costs is environmental damage, if we do not take into account the opportunity cost of lost opportunities due to congestion (Mervart & Vackova, 2019).

For these reasons, it is desirable to increase the support for public transport by the authorities and especially by destination management. Improved transport services, better coordination, shorter journey times and increased frequency and convenience of transport services can play a decisive role in increasing the number of visitors to tourist destinations (Tourismnotes.com, 2021). The relationship between public transport and visitor arrivals to tourist destinations is not yet a very common topic of expert studies.

Destination management and research agencies are dealing with related topics with the aim of aligning traffic flow with the needs of tourists, expanding their interest in other destinations and extending their stay in the Czech Republic. According to KPMG (2018), the length of stays from source markets is shortening. Unlike the usual source markets, tourism from these destinations is organised, which unfortunately contributes to a shortening of the average length of stay. Travel agents mainly recommend Prague, Český Krumlov and several other Czech and Moravian destinations as places worth visiting.

In 2019, more than 8 million tourists came to Prague and spent almost 18.5 million nights here. However, the average number

of overnight stays is only 2.29 nights (Czech Statistical Office, 2021). While the number of visitors to Prague has been increasing in the long term, the average length of their stay has been decreasing. While in 1996, the average length of stay in mass accommodation establishments was 3.7 days, by 2019, it decreased by more than 1.4 days. Prague is no exception, however, and it is showing a very common worldwide trend in recent years: a reduction in the total length of stay in favour of stays in more destinations and not only in urban ones. Not only are more people travelling, but they are also travelling to more places and more often (several times a year). During the COVID-19 pandemic, the number of tourists in Prague dropped sharply. In 2020, the number dropped to 2.2 million (27% of the previous year); a year later, it was only 2.4 million. It was only in 2022 that there was a marked recovery, with almost 6 million tourists (less than a quarter of them domestic) arriving in the capital (Czech Statistical Office, 2023).

With regard to the scope of the research, individual tourism destinations were selected to represent different types of tourism both in terms of geographical location/accessibility and type of tourist attraction. The transport analysis was carried out in the four selected destinations, which differ in the quality of public transport organised by the respective regional authority. The field research was carried out using a combination of simple observation and interview methods. For the most part, the focus was on short journeys, mainly those that did not exceed three overnight stays in the destination. The present paper concentrates on short stays of two to four days because of current trends. The main focus of the research is on the mode of transport to the destination, taking into account its modal split, the time required and other factors.

In order to increase tourist flows, the competitive advantages of the selected four destinations are analysed, and the results are summarised in Tab. 1. For the sake of representativeness of the survey, destinations in different regions, with different positions in the transport system and with different tourism backgrounds were selected (Vystoupil & Sauer, 2006).

Jánské Lázně, as a tourist destination, is served by weak rail and strong bus services. The destination is located in a region that is served by secondary transport to a certain

extent and has set standards for this. Another destination in the study is Český Krumlov, with a relatively strong tourist and transport infrastructure, located in a region with a strong

public transport logistics structure. This destination has a strong competitive advantage over the other destinations studied. Jánské Lázně does not have a railway, which significantly

Tab. 1: Competitive advantages of selected tourist destinations in the Czech Republic – Part 1

Factors of competitive advantage	Destination	Position of transport tourist directions				
		Strong	Comparatively strong	Neutral	Comparatively weak	Weak
Factors in the production of transport travel services						
– Level of provision with tourist resources	Jánské Lázně		+			
	Český Krumlov	+				
	Lednice		+			
	Macocha			+		
– Level of provision with tourist infrastructure	Jánské Lázně		+			
	Český Krumlov	+				
	Lednice		+			
	Macocha		+			
– Level of information support	Jánské Lázně		+			
	Český Krumlov	+				
	Lednice		+			
	Macocha					
– Level of awareness for foreign and domestic tourists	Jánské Lázně		+			
	Český Krumlov	+				
	Lednice		+			
	Macocha			+		
– Geographical location	Jánské Lázně	+				
	Český Krumlov		+			
	Lednice			+		
	Macocha			+		
– Availability of railway transport	Jánské Lázně					+
	Český Krumlov		+			
	Lednice				+	
	Macocha					+
– Availability of bus transport	Jánské Lázně	+				
	Český Krumlov	+				
	Lednice	+				
	Macocha				+	
Conditions of domestic demand	Jánské Lázně					+
	Český Krumlov	+				
	Lednice	+				
	Macocha		+			

Tab. 1: Competitive advantages of selected tourist destinations in the Czech Republic – Part 2

Factors of competitive advantage	Destination	Position of transport tourist directions				
		Strong	Comparatively strong	Neutral	Comparatively weak	Weak
Level of development and compatibility in foreign markets						
– Public catering	Jánské Lázně			+		
	Český Krumlov	+				
	Lednice		+			
	Macocha			+		
– Connecting services	Jánské Lázně		+			
	Český Krumlov	+				
	Lednice	+				
	Macocha			+		
– Insurance	Jánské Lázně	+				
	Český Krumlov	+				
	Lednice		+			
	Macocha			+		
– Banking services	Jánské Lázně		+			
	Český Krumlov	+				
	Lednice		+			
	Macocha				+	
– Production of souvenirs and other corresponding tourist demand	Jánské Lázně	+				
	Český Krumlov	+				
	Lednice	+				
	Macocha		+			
Foreign economic strategy of transport logistics	Jánské Lázně		+			
	Český Krumlov	+				
	Lednice	+				
	Macocha			+		
Transport policy of the country	Jánské Lázně	+				
	Český Krumlov	+				
	Lednice	+				
	Macocha	+				
Level of contingency planning	Jánské Lázně		+			
	Český Krumlov	+				
	Lednice		+			
	Macocha	+				

Source: own

reduces tourist flows to this tourist destination and requires the optimisation of bus transport. The tourist destination of Lednice has

a well-known tourist attraction – the chateau, which is a historical and architectural treasure. It has the potential to increase tourist flows,

but this requires the creation of an extensive transport network. The tourist destination of Macocha is located in a gorge in Moravian Karst protected landscape area and must also optimise bus transport.

The field research took place in the summer season of 2021 and was completed in November of the same year.

The research was conducted outside the high season to confirm whether a prolonged season is another long-term trend. The accessibility of the destination is measured from Prague in all cases, as it is the most important tourist destination in the Czech Republic and thus has the most significant potential.

To gather primary marketing information, marketing research was conducted, the methods of which are presented. Primary information was obtained through interviews with experts. This method has a number of advantages. Interviews with experts do not require much time, money and work, yet they allow for getting to the heart of the problem, determining as many possible solutions as possible and checking the feasibility of more extensive research. The criteria for the selection of experts were their level of education and experience in tourism. After interviewing the experts and processing secondary information, further data was collected through selective observation via telephone interviews and correspondence.

Due to the nature of the research, a sample survey was conducted among visitors to selected tourist destinations. Its evaluation was carried out using quantitative statistical methods, namely the Student's *t*-test and chi-squared test (Renyi, 1970). The results were then verified and supplemented by structured interviews with selected tourism actors in each destination, i.e., executives of transport companies in the regions where the selected destinations are located.

In order to determine the current state of public transport and its potential for tourism in the selected destinations, the research objective and questions were set. The aim of the paper is to identify and document the relationship between the intensity of public transport and the number of visitors to selected tourist destinations using the examples of Český Krumlov, Janské Lázně, Lednice and Macocha. At the same time, we want to find out through measurement whether a higher quality of transport leads to an increase in the number of visitors to a destination. Based on research samples from different destinations differing in their nature, trends in the use of public and individual transport can be estimated. Based on this, it should be possible to show whether the quality of public transport contributes significantly to its higher use by tourists (the effect on tourists is expected to be different from the effect on residents and regular travellers).

Tab. 2: Search questions, hypotheses and sources of information in the case of public transport transportation

Research questions	Hypothesis	Source of information
<i>RQ1: What is the interdependence of factors relating to service providers and consumers?</i>	Excessive waiting, delays and cancellations of scheduled journeys (due to adverse weather conditions, terrorist attacks, and strikes)	Experts, secondary information
<i>RQ2: What is the intensity of public transport in each destination and how is this transport segment used for the purposes of tourism?</i>	The state administration is responsible for setting frameworks and/or developing legislation and other rules, as well as regulating transport: Czech Railways, Czech Airlines or networks (Railway Infrastructure Administration, Road and Motorway Directorate, regional road administrations)	Sources of secondary information
<i>RQ3: What are the trends in the destinations studied and how do they affect service providers in tourism?</i>	Traffic analysis, planning, organisation of operational control and verification; it is essential to know the number, timing and routes of potential user journeys	Interviews with experts, collection of primary information

Source: own (based on Starostina, 2018)

To achieve this, the following research questions were set (Tab. 2):

RQ1: What is the interdependence of factors relating to service providers and consumers?

RQ2: What is the intensity of public transport in each destination, and how is this transport segment used for the purposes of tourism?

RQ3: What are the trends in the destinations studied, and how do they affect service providers in tourism?

3. Conceptual structure

Transport is vital for tourism. Tourists need to be transported not only to a destination and back, but they also use transport services in a destination and also outside it, e.g., within the optional trips.

Transport problems such as excessive waiting, delays, and cancellation of scheduled journeys (due to bad weather, terrorist attacks, and strikes) can significantly affect tourist satisfaction. Tourists demand safety, comfort, an efficient transport network and adherence to standards as well as promises. Most transport operators belong to the private sector. The state administration is primarily responsible for setting frameworks or developing legislation and other rules and regulating transport. It commissions basic transport services. It may own or co-own carriers (e.g., Czech Railways, Czech Airlines) or networks (Railway Infrastructure Administration, Road and Motorway Directorate, regional road administrations) (TourismTeacher.com, 2021).

Transport services form an important and extensive part of the service sector and are a basic condition for the implementation of tourism. As the definition implies, tourism is described as the movement of people outside their own environment to places outside their permanent residence for various purposes other than paid work (Lohmann & Duval, 2011).

The whole process of traffic management makes sense for the above reasons to satisfy customer requirements and maximise the number of passengers carried on public transport. There are several sub-processes that are linked to each other, including transport analysis, planning, organisation, operation control and monitoring (Zeleny et al., 2017).

The analysis can be carried out by a number of methods suitable for different cases.

The most commonly used methods are based on tracking passenger flows with different outputs, such as records of tickets sold, counts using sample tickets, interviews and simple physical observation. The analysis can be carried out both in the context of public transport (e.g., traffic flows in buses) and individual transport (e.g., numbers of vehicles on the roads, car park utilisation rates). The outputs of such analyses are crucial for the successful planning of transport links and relationships (Zeleny et al., 2008).

The planning consists mainly of the development of correct routing, the determination of intervals, the use of appropriate means of transport and the subsequent drawing up of public transport timetables on the relevant lines in the public transport area. In the case of individual transport, the capacity of roads and car parking areas should be examined. Public transport timetables in the Czech Republic are primarily the responsibility of the relevant regional authorities, but each of them proceeds in a slightly different way. Regions have different preferences and invest different amounts of money. However, there is a major disadvantage for all of them. Due to the difficulty of defining the traffic flows in secondary transport, which includes tourism, public transport is primarily based on primary transport interests, while secondary transport is severely constrained. Some regions tend to provide transport services for general secondary transport regardless of the specific tourist destination, while other regions focus on a specific destination together with general services. Some regions focus only on selected destinations, but this does not provide the desired effect because of the lack of networked service. Infrequent services are not able to attract as many passengers due to poor transfer, and tourists, therefore, choose individual transport (Zeleny et al., 2008).

This implies that there is no single approach. The introduction of a single model would probably be a good step (at least for serving outstanding destinations). Ideally, it should follow the general pattern of the South Moravian Region, but for this, it is necessary to have sufficiently detailed and valid outputs from further analyses. There is also a lack of a common approach of regional authorities, which are the main commissioners of transport services, and their cooperation within integrated transport systems (with exceptions as the cooperation of Prague and the Central

Bohemian Region within the integrated ROPID system or the Pardubice and Hradec Králové Regions within the integrated VYDIS system).

3.1 Crucial determinants influencing modal split

In general, price, speed of transport, reliability, travel standards and quality of connections are considered to be essential factors in clients' decision-making. These determinants are decisive to different degrees for different user groups. Undoubtedly, their importance differs for regular commuters and for tourists, an analogy can also be found in classical material logistics (Pernica, 2004). The most important factors determining modal split are shown in Tab. 3.

3.2 Statistics – Student's *t*-test

A sample survey was conducted among visitors to the selected tourist destinations and evaluated using quantitative statistical methods (the Student's *t*-test and chi-squared test). The results of the car/bus travel survey compared to tour operators and individual travellers are shown in Tab. 4.

The distribution by gender and mode of transport is shown in Tab. 5.

Older people and grandparents prefer the bus, while families with children prefer the car. Young couples also prefer cars. People who travel by car tend to opt for individual holidays, but when it comes to buses, travel with travel agencies prevails. Men prefer cars, but cars are slightly more prevalent among women, too. Curiosity is the reason for some respondents

to choose the railway as a mode of transport. Discovering new places is the reason cited for air travel. The bus is most often used when travelling to well-travelled destinations.

The results of the analysis of the reasons for travel restrictions are shown in Tab. 6. The results of the gender restriction comparison are shown in Tab. 7. The study of education vs limitations analysis is defined in Tab. 8.

The research shows that consumers of travel services more likely use road transport for reasons of convenience and accessibility.

Price is also a frequent limitation, followed by the "Czech" need for comfort. For men, it is only price, and for women, there are more reasons, most often convenience and parking. Only the group of respondents with secondary education (high school diploma = "maturita") takes price into account as a limitation. People with higher education take into account deeper issues of travel – speed, frequency of transport services, and convenience. Price is not a constraint for domestic travel. Those who prefer to air travel see price as a constraint. In the case of buses, comfort is the most pressing issue. For trains, it is mainly the continuity of services and price that matters. When it comes to the car, it is primarily speed.

To optimise the study of tourist flows, a transportation system is used in which the total number of tourists coincides with the total traffic demand. Such a transportation system is called balanced; otherwise, it is unbalanced.

Tab. 3: Crucial determinants in modal split

Crucial determinants	Specification
Convenience and travel culture	For the segment of seniors and families with children, the choice of mode of transport based on comfort is essential
Speed	Speed is important for the corporate clientele segment, such as business and time-pressured people
Sensitivity to the price	The cost of transport is essential for the majority of the population because a person who is socially disadvantaged will not choose to travel by an expensive mode of transport
Parking fees	Fees usually apply to those who use individual car transport, families with children, and young couples
Frequency of connections	Allows for high transport utilisation within the area/destination

Source: own (based on Červinská (Židová), 2019)

Tab. 4: Travelling by car/bus vs travel agency/individual

Labels	Number of respondents
Car	589
– Travel agencies	106
– Individuals	483
Bus	243
– Travel agencies	243
Total	832

Source: own (based on Červinská (Židová), 2019)

Tab. 5: Distribution by gender and mode of transport

Labels	Number of respondents
Men	285
– Car	285
Women	547
– Car	304
– Bus	243
Total	832

Source: own (based on Červinská (Židová), 2019)

Tab. 6: Reasons, limits of travelling

Labels	Number of respondents
Price	346
Convenience – travel culture	158
Fees	102
Connection frequency	86
Speed	83
Continuity of connections	57
Total	832

Source: own (based on Červinská (Židová), 2019)

The following notation is used to write the problem in a mathematical form.

$$F = \sum_{j=1}^n \sum_{i=1}^m c_{ij} x_{ij} \rightarrow \min \quad (1)$$

where: a_i – total number of tourists required at the i point of departure; b_j – total number of tourists required at j destination; c_{ij} – cost of transporting of one tourist from the i point of departure to the j destination; F – total cost of

Tab. 7: Gender vs limitations

Labels	Number of respondents
Men	285
– Price	285
Women	547
– Convenience – travel culture	158
– Fees	102
– Connection frequency	86
– Speed	83
– Price	61
– Continuity of connections	57
Total	832

Source: own (based on Červinská (Židová), 2019)

Tab. 8: Education vs limitations

Labels	Number of respondents
Doctoral studies	19
– Continuity of connections	19
High school	364
– Price	346
– Convenience – travel culture	18
University (bachelor)	263
– Convenience – travel culture	140
– Connection frequency	86
– Speed	37
University (follow-up study)	131
– Fees	85
– Speed	46
– Basic	2
– Fees	2
Total	832

Source: own (based on Červinská (Židová), 2019)

transporting the optimal number of tourists in a given direction; x_{ij} – initial unknown of the optimal number of tourists transported from i point to j point.

$$\sum_{j=1}^n x_{ij} = a_i, \quad i = 1, 2, \dots, n \quad (2)$$

$$\sum_{i=1}^n x_{ij} = b_j, \quad j = 1, 2, \dots, m \quad (3)$$

$$x_{ij} \geq 0, \quad i = 1, 2, \dots, n, \quad j = 1, 2, \dots, m \quad (4)$$

This is how the transport minimisation is calculated. Tourists can be transported to the studied four selected destinations. Of these destinations, the most optimal one is Český Krumlov.

The main methodological approach was a sample survey in two forms: from the perspective of consumers (832 respondents) and from the perspective of providers (out of 881 travel agents registered in 2021, 463 replied to the questionnaire, i.e., 40%). Further research was conducted in the form of structured interviews. The respondents of the sample survey were potential visitors to the selected destinations. Structured interviews were conducted with representatives of selected carriers in each region. Another essential approach was field research in the form of observation (Červinská (Židová), 2019).

On the basis of the research carried out, it is possible to assess the importance of reducing external costs if the range of passenger transport to the destination (comfort, price, speed) is increased. Technical infrastructure can be understood as that close to the destination or the size of car parks, the density of the transport network, etc. Emphasis has been placed on short journeys in particular, implying a minimum of two nights and a maximum of four nights. This made the survey more accurate and useful.

The survey was conducted at the destinations over a three-year period – spring 2020, autumn 2020, spring 2021, autumn 2021 and spring 2022, autumn 2022. It took the form of observations, counts of people who got off at the selected stop, the number of buses and trains arriving (bus stop/station, train station), and selected car parks in the centre of the destination (number of cars). The interviews took place in late 2022, and their timing followed the field research. The questions were based on the results of the field research. Respondents from each area were the heads of the selected transport companies in the destination. They were all asked to answer the same four questions: i) Introduce the company you work for; ii) How has primary transport changed in the last five years?; iii) How has tourist transport changed in the last five years?; iv) How has the seasonal nature of transport changed in the last five years?.

3.3 Expected limitations in research

The following limits were set for this research. The first limit is determined by the return rate of the questionnaires (not proven). The next limit addresses the sensitivity of the data collection (the seasonal nature of the data), which is very important. The last limit was the search for a key to distinguish the categories.

It was necessary to base the research not only on a sample survey but also on data collection using the field research. The selection of an appropriate research date was also crucial, relating to the time of year and time of arrival at the targeted destination. It was essential to exclude periods of mass events in the targeted destination, such as wine festivals, as this could significantly bias the survey results. Fig. 1 shows standard errors in conducting the survey.

In the Czech Republic, tourists are used to being questioned in the same way as those in developed market economies. For many respondents, interviews are an opportunity to be listened to, to be useful, to divert attention from everyday concerns.

On the other hand, however, interviewees cannot always cooperate effectively due to lack of information and familiarity with the studied issue.

An equally serious problem is the fact of refusal. In many cases, success depends on the interviewer's preparation and professionalism, his or her ability to explain the purpose of the survey and his or her ability to generate interest in cooperation.

Despite the importance of strict adherence to all phases of marketing research, in practice, the development of the list of questions for the survey is a particularly important phase on which the results depend.

3.4 Risk factors of the survey

One of the risk factors is the low return rate of completed questionnaires (the expected return rate was 30%, but it ended up being higher, 40%). As the return rate of questionnaires is linked to different aspects, a high return rate cannot be expected. Personal acquaintance with experts in the field contributed a lot to the high return rate of the questionnaires. Due to the personal delivery of completed questionnaires or sending them by email, it can be assumed that the probability of returning the questionnaires increases. For this reason,

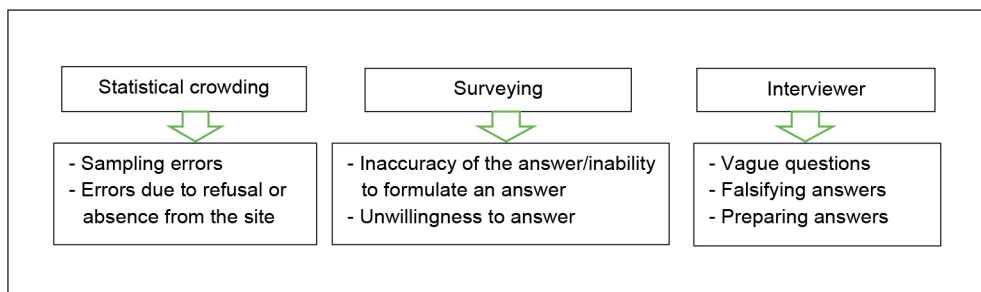


Fig. 1: Typical errors in conducting surveys

Source: Starostina (2018)

most of the experts who provided the structured interviews were contacted in person by telephone and subsequent email. This was not always successful, as it depended on the positive attitude of the respondents and the availability of time (Červinská Židová, 2019).

A set of sub-questions in the structured interviews dealing with the impact of public transport frequency on its use yielded interesting findings. Some assumptions were not confirmed. As expected, frequency has an impact on passenger numbers in general. This is true for both residents and tourists, as indicated by both field research on destinations and interviews with clients and tourism service providers. However, another key issue was not confirmed: frequency is not more important for either segment of travellers. Both place emphasis on it, but there are no discernible differences between them.

Travellers, in general, tend to follow the global trend of non-eco-friendly travel. There are several weak points. Convenience and comfort are still prioritised over environmental protection, respect for wildlife and mere ecological consideration. In the current frenetic world, travelling to/from destinations by private car is preferred. In fact, in most cases, this is the fastest and most convenient way, as evidenced by linking the results of field research and interviews. In the future, we should follow two main directions, regardless the primary or secondary segment, the price is the main consideration for travellers. Public transport should, therefore, be afforded a price advantage. This can be achieved through the continued internalisation of external

costs as well as financial support from various actors (local authorities that should have an interest in reducing individual transport in the destination, and tourism organisations). The second way is to increase the speed of public transport, not primarily by increasing the technological speed, but by improving the organisation of transport, well-connected transport links, better cooperation between segments and better use of means of transport. Cooperation between the different segments of public transport is a key. At present, there is more competition, which can lead to a reduction in the share of public transport. It is noticeable that most of the destinations surveyed do not have good quality rail services. However, as the differences in usage are large, the mode of transport does not play a major role.

For more effective public transport planning, a much deeper and longer-term analysis of public transport use needs to be provided using field surveys and data collected from transport operators. The latter aspect, however, depends on the quality and depth of data collected from transport operators, which is currently insufficient.

In terms of population, Český Krumlov stands out as a town, Lednice is a medium-sized settlement, and the other destinations have a low number of permanent residents. The number of inhabitants influences the density of the transport network. Jánské Lázně is located in a mountainous area, Lednice is located in a lowland area, and Macocha (Moravian Karst) is located in a landscape with a limited transport network (e.g., undulating

terrain, complex geomorphological conditions, rock formations), the remaining destinations are located in a hilly landscape. The density of the transport network partly depends on this.

All destinations studied are accessible by public and individual road transport. In some cases, individual transport is restricted, in the sense of hub and spoke, to the entrance of the destination, but transport within it is prohibited. Rail transport is theoretically available in all destinations except Macocha. However, the railway to Lednice is operated in a very limited seasonal mode at a special tariff, the distance of the railway stations Svoboda nad Úpou (the nearest railway station from Jánské Lázně) and Český Krumlov from the core of the destination is unsatisfactory, and the quality of the transport services is also insufficient. For this reason, everyone relies almost exclusively on bus transport. An exception is Český Krumlov, where a direct rail link to Prague has been introduced, at least to a limited extent. Nevertheless, the town centre is 1.5 km away from the station in hilly terrain.

There is a wide range of destinations and their characteristics. Undoubtedly, input parameters that influence the form of public transport service to a destination can be identified. These parameters include:

- The limited nature of the destination (if there are several sub-destinations within the main destination);
- The number of settlements in the destination and their size, the number of inhabitants and their transport flows;
- Seasonality;
- The nature of the attraction;
- Geographical characteristics;
- Available modes of transport and density of the transport network;
- The approach of local authorities to transport organisation and environmental protection.

4. Research on the use of public transport in selected destinations

The first step of the survey is to analyse in sufficient detail the transport in the selected destinations, which differ in the quality of public transport organised by the relevant local authorities. The field survey was carried out using a combination of simple observation and interviews, focusing mainly on short journeys spanning three nights in a particular destination.

In total, the survey was conducted in four destinations in different regions. Jánské Lázně was selected as a representative of a destination with a rich tourist transport infrastructure located in the region that provides, to a certain extent, the secondary transport service and has set its own standards for it. Český Krumlov has a relatively modest infrastructure but is located in a region using almost exclusively the primary segment of public transport. The survey is designed to show the differences in the use of transport by tourists in both regions. Český Krumlov has both bus and rail transport, while there is no train service directly in Jánské Lázně, but due to the location of the station, the tourists use the railway to a similar extent. The field research was conducted between 2020 and 2022.

The surveys were carried out outside the high season to confirm that there is a long-term trend of extending the high season. The survey also focused on the destinations of Lednice (chateau) and Macocha (gorge). The field research was conducted in 2017. The accessibility of the destination is in all cases surveyed from Prague, as it is the most important tourist destination in the Czech Republic and thus offers the greatest potential.

Destination Český Krumlov

The autumn 2017 survey shows that tourists accounted for approximately 35% of those who arrived in the destination in the period under review, but only 14% of them used public transport. This was apparently a lower proportion than in Jánské Lázně with the same share of total arrivals. Similar results emerged from the spring sample (Červinská Židová, 2019).

Destination Jánské Lázně

As a result, there was no difference in the number of transport links between the two off-season surveys, and the passenger structure is also similar. If we define passengers from Pec pod Sněžkou as tourism participants, then in autumn, they accounted for one-third of all arrivals to the town, of which two-thirds came by public transport. In the spring sample, the share of tourists was 30%, and three-quarters of them used public transport. It is clear that public transport has some potential and tourists use it. Apparently, the accessibility of the destination in the low season is sufficient, and the operation of services suitable for visitors

is adequately catered for. Service occupancy in terms of primary transport is a relatively weak feature. In this case, there is not expected to be a significant oscillation between the high and low seasons, which makes the usage by regular travellers weak (Červinská (Židová), 2019).

Destination Lednice

Compared to the other destinations surveyed, Lednice clearly shows the highest share of tourists in the total number of travellers. This may be due to the best transport offer in this destination, which suits not only the residents but also the tourists (in addition, it is strengthened in the high season in the form of secondary transport). However, it is also sufficient in the area of Macocha, where the share of tourists is not as high; this may be due to the nature of the destination, where the most visited attractions of the Moravian Karst are located, while Lednice as a destination is more limited, as tourists come mainly to the core of the destination and rather walk from the town to other attractive places. It is questionable whether the creation of a special tourist transport service would help, but there would be a problem of integration into the local integrated transport system of the South Moravian Region. As the area cannot be completely closed to public transport, two bus services of different operators should continue to operate here (Červinská (Židová), 2019).

Destination Macocha

The most visited parts of the Moravian Karst are closed to all car traffic. Visitors can use ecological means of transport, which makes the destination closed in the sense of hub and spoke. There are paid car parks in front of each cave. The exception is the Punkva Cave, where you can park your car or bus in the paid car parks at Rock Mill (Skalní mlýn) or Macocha Abyss. Within the destination, public transport is sufficiently used, but not for arriving at the destination. The question arises as to why, as the bus service from Blansko is quite good; this is probably due to the fact that visitors intend to visit more destinations (caves) during their visit. However, the public transport provides insufficient service for this, as the service is only in the direction of Blansko. The proportion of tourists using public transport would probably increase if the special line was extended to Blansko. At the same time, however, it is

necessary to extend the line to the entire Moravian Karst (Červinská (Židová), 2019).

4.1 The most important findings of sample survey among visitors to each destination

If we do not take into account travelling abroad or using air transport, respondents prefer road transport to rail. The shares of public and individual transport are therefore not equal. The share of rail transport is probably low because many destinations are inaccessible by train or the transport services are complicated. In international transport, higher prices and the apparent difficulty for some clients to purchase tickets may play a role, as the proportion of individual travellers is high. When respondents were explicitly asked about their preferences in terms of road transport, individual transport accounts for about two-thirds, which does not correspond to the proportion of those travelling individually and with a travel agent. In this case, there is an assumption of public transport use, which leads to the conclusion that there are also clients who prefer public transport when travelling individually. Therefore, there is potential for an increase in its share. The proportion of tourists using public transport, which emerged from the field survey, is generally lower than that from the interviews. As a result, this potential is not fully exploited, and new passengers can be attracted to public transport.

Most clients prefer the summer season, but spring and autumn are not insignificant either. This again shows the validity of extending the offer to these periods, which were the focus of the field research. The public transport offer should be adapted to this.

There is a key question – What factor would motivate you to start travelling by public transport? It shows that half of the clients considered price to be the deciding factor in their decision. The other answers are more evenly represented, with ecology coming in at the very last place. This confirms that, despite all the proclamations, ecological thinking is not widespread among people, as they think mainly in economic terms; as a result, it can be seen that there is a need to further strengthen the internalisation of external costs (including ecological costs) so that this item appears in the price, which is the most important factor in decision-making. In this sense, it is possible to discuss the strengthening of cheaper rail transport compared to road

transport (again by means of internalisation). However, the discussion must not degenerate into a fight between the customers of the different segments of public transport. They should cooperate and increase their collective share compared to individual transport. A total of 832 respondents took part in the survey (Červinská (Židová), 2019). The results of the study of factors that influence modal split are presented in Fig. 2.

Speed is also an important factor. For this reason, public transport planning should also aim to increase speed without major infrastructure reconstruction. Good results at relatively low cost can be achieved by means of better planning and well-connected transport links, more frequent services and the introduction of direct links on key routes. This requires better outputs from transport analysis. In order to obtain more accurate data, it was necessary to carry out long-term field surveys at the destinations to exclude possible deviations due to bad weather.

Four destinations were selected for the field research. They differ in character, not only in their geography and attractiveness but also in the public transport system and the nature of the settlement in general, which in turn influences public transport.

Lednice records the highest number of tourists on public transport, both in absolute and

relative figures. As a UNESCO World Heritage Site, it is characterised by high visitor numbers. It has a favourable terrain and a relatively high population density. The integrated transport system of the South Moravian Region is considered to be the most sophisticated in the Czech Republic, both in terms of rates and quality of operation.

Public transport in Jánské Lázně is also sufficiently used by visitors, with a relatively high share of secondary transport within the destination. In other destinations, the share of tourists arriving by public transport reflects the insufficient public transport service within the whole destination (Macocha within the Moravian Karst). For Český Krumlov, the cause cannot be clearly identified because the public transport service in the destination is sufficient, and the potential for visitors to use it is high. The reason for this is probably the general trend of using mainly individual transport in the tourism segment. In general, a higher share of arrivals by individual transport can be observed. By means of questionnaires, the authors tried to find out whether better transport services could increase the use of this segment.

As for the transport operators' attitude to the issue, they agreed that the tourist season is extended and the number of passengers on a constant number of routes is approximately stable. With regard to individual destinations,

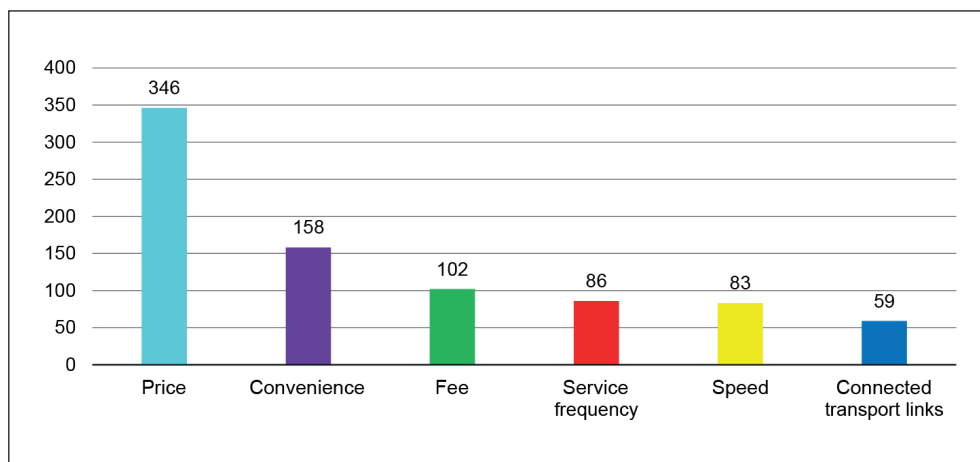


Fig. 2: Factors influencing modal split (number of respondents)

Source: own (based on Červinská (Židová), 2019)

differences can be identified which stem from their respective features (number of inhabitants, type of attraction). Unfortunately, transport operators do not have the relevant statistics that could help to segment passengers and identify trends. Instead, they tend to use estimates.

A comparison of the individual destinations and their respective research samples leads to the conclusion that the selected destinations differ so much in their features that it would be very difficult to build a universal model. The main differences are as follows: the extensiveness of the destination (Jánské Lázně vs Lednice), the geographic nature of the area (lowlands/mountains), the concentration of the destination in one core location versus several attractive locations in one destination (Český Krumlov vs the Moravian Karst), and the approach of local authorities to transport services (South Moravian Region vs South Bohemian Region, or regular vs irregular timetables). If a destination has better quality transport services and a more confined character, the share of public transport is higher and vice versa. Interviews with representatives of transport operators also suggest a similar conclusion, which supports this idea. On this basis, the influence of these actors is confirmed.

5. Research results

Transport sustainability is very closely linked to tourism. It is essential to focus not only on the primary transport service but also on the secondary service, which includes tourism. The research sample was not very large, yet it confirmed the stated hypotheses. As far as travelling by private car is concerned, the main reasons were convenience and comfort and not having to take into account anyone else's needs but to adapt the journey to one's own requirements.

The analysis of public transport in destinations found many shortcomings. Unfortunately, not all modes of transport are available to reach the destinations, which can be a constraint for travellers. In tourism terms, transport needs to be considered in terms of its contribution to passenger enjoyment, satisfaction and willingness to use that particular mode of transport again. Field research carried out over two seasons in four selected destinations using different public transport service concepts showed that these factors clearly affect the use of public transport by visitors.

Two off-season time periods were deliberately chosen to confirm, on a smaller sample, that it is indeed worthwhile to engage in further analysis and development of a universal model. The assumptions were confirmed, and a similar proportion of tourists and primary segment users were observed in the selected destinations. Nevertheless, their relation seems to differ. In the case of a destination where public transport is more focused on secondary transport, the share of tourists is substantially higher. It is not true that tourists do not use public transport in principle; if enough transport options are offered, there is potential. This confirms the purpose of the research, which will continue to outline a general model. Extensive research will be carried out in the high season to ensure that the data required for the planning phase is as detailed and accurate as possible.

It can be assumed that the share of tourists in the total number of passengers should increase during the high season, but the share of public transport occupancy should not increase dramatically. As the quoted bus occupancy rates show, there is sufficient capacity for the increase even without an increase in the number of public transport links. If an appropriate system is introduced, further increases can be achieved without significant cost increases simply by changing the organisation of public transport.

As for the limitations of this study, they were significant. This raises the need for further research in the form of focusing on other segments, destinations and a more detailed analysis of road transport. Regarding the coding of the relevant sample, it may be slightly biased as there is a large difference in the sphere of education. If we consider primary, secondary, and university education, there are large gaps that need to be addressed in a further and more detailed survey. The other option, education at higher vocational schools, was not present at all. As regards the questions in the questionnaire, there is room for more elaboration and clarification. In general, however, the sample of respondents is large, with high validity. Statistical testing yielded high statistical significance, as evidenced by the partial conclusions in the practical section.

As regards the sample survey among service providers, a total of 463 respondents were surveyed, which is a sufficiently large sample for such a specific business area.

The research questions were answered as follows:

- *RQ1: What is the interdependence of factors relating to service providers and consumers?* As far as service providers are concerned, a total of 832 respondents participated in the sample survey, which is a very strong sample. Consumers prefer to drive their own car because of time, convenience, price and frequency of services. If they travel by bus, it is usually to nearby destinations. However, when it comes to travel within the country, this is very weak. People most often travel to Prague and the South Bohemian and South Moravian Regions.
- *RQ2: What is the intensity of public transport in each destination, and how is this transport segment used for the purposes of tourism?* All destinations surveyed are accessible by public transport, but the level of use varies. Bus transport is mainly used to reach the destination. Rail transport faces various difficulties (long distance to the destination and the necessity to use connecting transport (Jánské Lázně, Macocha) or limited traffic (Lednice). Bus transport is more widely used, especially in Lednice. Secondary transport within the destination is also important in Jánské Lázně.
- *RQ3: What are the trends in the destinations studied, and how do they affect service providers in tourism?* Shortening the length of stay is described as a trend. Service providers therefore offer stays in the form of extended weekends, and various events. The survey can still be compared with previous surveys. There is also the possibility to create a transport service model from the results of all surveys. The survey may yield very interesting results in coronavirus or post-epidemic conditions.

Conclusions

Based on the results of the analysis of four destinations during two seasons (spring and autumn) for three years, it was found that most tourists use secondary transport. The reasons are convenience, lack of time, higher comfort, acceptable price of their trip according to their own requirements and lack of provision of primary transport. It has been shown that the capacity of bus transport to destinations is sufficient and can positively influence the increase of tourist flows without increasing logistic costs only by changing

the organisation of public transport. However, there are problems with rail transport to some destinations, and the intensity of use of the bus service varies as it does not fully meet the needs of tourists from different segments of the population.

It should be noted that not all modes of transport can reach all destinations, which reduces the number of passengers. The study identified a relationship between the quality of transport infrastructure and the increase in tourist flows to destinations. In order to increase tourist flows, we propose to develop a transport service model based on bus transport in cooperation with a network of tourist information centres. To develop specific routes with suitable timetables and bus sizes, we recommend further research for individual destinations in the summer and winter seasons.

Another area of research will be the creation of a model of bus transport development for the entire Czech Republic.

References

- Burda, T. (2014). *Význam změn hranic v procesu formování vnitřních periferií na území Česka od poloviny 19. století* [The significance of changes in administrative boundaries in the process of formation of internal peripheries in the territory of the Czech Republic since the mid-19th century] [PhD Thesis]. Faculty of Natural Sciences, Charles University.
- Červinská (Židová), V. (2019). *Vliv dopravní obslužnosti na cestovní ruch* [The impact of transport on tourism] [PhD Thesis]. Faculty of Business Administration, Prague University of Economics and Business.
- Czech Statistical Office. (2021). *Cestovní ruch* [Tourism]. Czech Statistical Office. https://www.czso.cz/csu/czso/cestovni_ruch
- Czech Statistical Office. (2023). *Czech statistical government* [Satellite account of tourism account]. Czech Statistical Office. https://www.czso.cz/csu/czso/tabulky_satelitniho_uctu_cestovniho_ruchu
- Dileep, M. R., & Pagliara, F. (2023). Public transport and urban-rural tourism. In *Transportation systems for tourism* (pp. 85–101). Springer International Publishing. https://doi.org/10.1007/978-3-031-22127-9_5
- Fengjun, T., Yang, Y., & Lan, J. (2022). Spatial spillover of transport improvement on tourism growth. *Tourism Economics*, 28(5), 1416–1432. <https://doi.org/10.1177/1354816620982787>

- Haçia, E., Wagner, N., & Łapko, A. (2023). The importance of city logistics for urban tourism development: Searching for a new research field. *Energies*, 16(1), 175. <https://doi.org/10.3390/en16010175>
- Iliev, D. (2021). A new framework to understand transit tourism-related issues on pan-European transport corridors. *Mitteilungen der Österreichischen Geographischen Gesellschaft*, 163, 371–389. <https://doi.org/10.1553/moegg163s371>
- KPMG. (2018). *Audit, tax and consulting services. Logistics*. KPMG. <https://kpmg.com/cz/cs/home.html>
- Le-Klähn, D.-T., Hall, C. M., & Gerike, R. (2014). Promoting public transport use in tourism. In *Understanding and governing sustainable tourism mobility. Psychological and behavioural approaches*. Taylor & Francis.
- Lohmann, G., & Duval, D. (2011). Critical aspects of the tourism-transport relationship. *Contemporary tourism review*. Goodfellow Publishers.
- Maas, S., Bugeja, M., & Attard, M. (2021). Sustainable tourism mobility in Malta: Encouraging a shift in tourist travel behavior through an innovative smartphone app for trip planning. In *Sustainable transport and tourism destinations* (Vol. 13, pp. 79–95). Emerald Publishing Limited. <https://doi.org/10.1108/S2044-994120210000013009>
- Małysz, M. (2021). Multimodal solutions as factors of increasing transport accessibility – The case of Slovakia-Polish Baltic coast route. *Geographical Journal*, 73(2), 161–178. <https://doi.org/10.31577/geogrcas.2021.73.2.09>
- Mervart, M., & Vacková, P. (2019). *Dopravní obory v cestovním ruchu* [Transport unions in tourism]. Idea Servis.
- Norros, L. (2018). Understanding acting in complex environments: Building a synergy of cultural-historical activity theory, peirce, and ecofunctionalism. *Mind, Culture, and Activity*, 25(1), 68–85. <https://doi.org/10.1080/10749039.2017.1350714>
- Pernica, P. (2004). *Logistika (supply chain management) pro 21. století* [Logistics (supply chain management) for 21st century]. Faculty of Business Administration, Prague University of Economics and Business.
- Pozdnyakova, A., Dmitrieva, D., Kalita, M., & Karasu, K. (2023). Tourism and transport infrastructure: An analysis of ethnic preferences. In *Proceedings of International Scientific Conference “Fundamental and Applied Scientific Research in the Development of Agriculture in the Far East” (AFE-2022)* (Article No. 04010). E3S Web of Conferences. <https://doi.org/10.1051/e3sconf/202337104010>
- Prg.areo.cz. (2021). *Odbavení cestujících* [Passenger check-in]. Prg.areo.cz. <https://www.prg.aero/letiste-vaclava-havla-praha-odbavilozarok-2019-rekordnich-178-milionu-cestujících>
- Pulina, T., But, T., Khrystenko, O., & Zaytseva, V. (2020). Managing the field of reconstruction and preservation of historical and cultural complexes in Ukraine and Europe. In *Proceedings of The 2nd International Conference on Building Innovations: ICBI 2019* (pp. 709–720). <https://doi.org/10.1007/978-3-030-42939-3>
- Renyi, A. (1970). *Probability theory*. Dover Publications, Inc. Mineola. <https://doi.org/10.2307/1402283>
- Sakalauskaite, G., Saparniene, D., & Reinholde, S. (2020). Accessible tourism development in the postsoviet country context: A case of Klaipė Da City, Lithuania. *Scientific Papers of the University of Pardubice*, 28(1), 1021.
- Starostina, A. O., Dlihach, A. O., & Kravchenko, V. A. (2005). *Promyslovyi marketynh: Teoriia, svirovoyi dosvid, ukrainska praktyka: Pidruchnyk* [Industrial marketing: Theory, world experience, Ukrainian practice: Textbook]. Znannia.
- Tiranan, W., Krittika, J., & Nuchakorn, K. (2019). The educational logistic potential and supply chain link to agro-tourism through learning the lifestyle Amphoe Lansaka, Nakorn Sri Thammarat. *International Journal of Recent Technology and Engineering*, 8(2S2), 108–112. <https://doi.org/10.35940/ijrte.b1020.0782s219>
- TourismNotes.com. (2021). *TourismNotes.com*. <https://tourismnotes.com/tourism-transportation/>
- TourismTeacher.com. (2017). *TourismTeacher.com*. <https://tourismteacher.com/>
- Troshin, A., Stolyarova, V., & Stolyarova, Z. (2022). Methodic approaches to the assessment of regional investment attractiveness in the sphere of tourism and transport infrastructure. In *Lecture Notes in Networks and Systems* (Vol. 510, pp. 631–639). Springer International Publishing. https://doi.org/10.1007/978-3-031-11051-1_64
- Uršič, M. (2022). Prednosti in slabosti avtomobilizma kot temelja turističnega razvoja Slovenije [The advantages and disadvantages of automobile transport as the foundation of tourism development in Slovenia]. *Dela*, 2022(57), 89–112. <https://doi.org/10.4312/dela.57.89-112>

Vystoupil, J., & Sauer, M. (2006). *Zaklady cestovního ruchu* [Foundation of tourism]. Faculty of Economics and Administrations, Masaryk University of Brno.

Winston, C. (1985). Conceptual developments in the economics of transportation: An interpretive survey. *Journal of Economic Literature*, 23(1), 57–94.

Zeleny, L., Mervart, M., Hunak, J., & Cervinska, V. (2017). *Osobní doprava* [Personal transport]. ASPI.

Zeleny, L., Zurynek, J., & Mervart, M. (2008). *Dopravní systémy v cestovním ruchu* [Transport processes in tourism]. C.H. Beck.

Zolotarev, S., Kusakina, O., Ryazantsev, I., Yushchenko, I., & Ivashova, V. (2023). Transport accessibility assessment of rural tourism facilities. In Proceedings of *International Scientific and Practical Conference “Environmental Risks and Safety in Mechanical Engineering” (ERSME-2023)* (Article No. 04005). E3S Web of Conferences. <https://doi.org/10.1051/e3sconf/202337604005>