

Spatial patterns of travel behaviour in Czechia: Continuity or change?

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ABSTRACT Travel behaviour research is an extremely complex study area focused on people's movements in space. It studies transport mode choices and other individual mobility characteristics. In Czechia, there has been a significant change in the population's spatial mobility patterns and travel behaviour since the 1990s. This paper focuses on studying the spatial patterns of the Czech population's travel behaviour between 2011 and 2021. The analysis is based on changes in the use of transport for commuting based on the last two population censuses. It reveals the spatial patterns and specifics of using different transport modes and synthetically assesses the main changes in the use of car and public transport. A municipality typology according to travel behaviour indicates a continuation of trends from previous periods (the growing importance of cars), but also significant changes in the development of travel behaviour in typologically different areas of Czechia.

KEY WORDS travel behaviour – spatial mobility – commuting – spatial patterns – Czechia

We would like to dedicate this paper to the memory of our colleague, Mgr. Daniel Seidenglanz, Ph.D. (1977–2021).

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1. Introduction

In recent decades, populations' spatial mobility has become an important research topic in geography and many other disciplines. The main reasons for the increasing interest in spatial mobility research are the increase in traffic intensities, the construction of new transport infrastructure, changes in the distribution of socio-economic activities within space, and negative effects such as congestion, traffic accidents, environmental impact, etc. Moreover, the effects of increasing spatial mobility can be observed from the local to the global level. During our civilisation's development, the movements of people and goods in space have gradually intensified. Today's society is therefore highly mobile and largely dependent on transport. Transport accessibility and mobility options thus have a significant impact on everyone's life.

The effects of transport and the increasing mobility described above can also be observed in Czechia (see Section 2). Although many studies have recently focused on analysing the evolution of transport and related phenomena (see e.g. Seidenglanz 2010; Kraft, Halás, Vančura 2014; Taczanowski 2015;), relatively little attention has been paid to changes in the population's travel behaviour. Travel behaviour can be defined as the study of an individual's or group's behavioural patterns when moving through space, including mainly the transport mode choice, route, time of travel, frequency of travel, and purpose of travel. It is an extremely complex research topic encompassing many aspects of a population's spatial mobility, including the related links to its social, demographic, and economic characteristics. This complexity and the lack of suitable data sources become the main barriers to a broader study of the Czech population's travel behaviour.

The paper has several objectives. The main one is to study and evaluate the spatial patterns of the Czech population's travel behaviour. It focuses on identifying crucial changes in the transport mode choice for the population's regular commuting trips between 2011 and 2021. The empirical part of the study is based on the analysis of two recent population censuses which allow the identification of trends and spatial differences in the Czech population's use of different transport modes. This builds on studies that have previously investigated travel behaviour in Czechia (Seidenglanz 2007; Marada, Květoň 2010; Květoň et al. 2012; Kraft, Prener 2014; Štastná, Vaishar, Stonawská 2015). A sub-objective of the developmental comparison is to propose a typology of travel behaviour at the municipality level, which enables the discovery of key spatial patterns in Czechia's travel behaviour. The study results are of particular social relevance; they can be used at both the cognitive and application level. The resulting analyses and syntheses allow us to understand the key determinants and spatial variations in travel behaviour, including its recent changes. They also have a strong application potential, for example in transport planning, transport policy guidance, and regional development.

The article is structured as follows. The introductory part is followed by a theoretical grounding of the issue. Attention is focused on the general principles of travel behaviour study and identifying the main trends in the travel behaviour of Central European countries. The data and methods section introduces the key methodological aspects of the research. The following chapter analyses the sub-aspects of travel behaviour in Czechia in 2011 and 2021. The final chapter contains a synthesis of the issue and suggests further perspectives for research on this phenomenon.

2. Theoretical background

As noted, travel behaviour is an extremely complex category of study, with many underlying factors. Researchers thus seek not only to describe the basic travel behaviour characteristics for individuals or population groups but more importantly to understand the broader context. Therefore, the focus is on the individual manifestations of travel behaviour. Among the most important and geographically relevant topics are the transport modes choice, understanding the way individuals move in space, time spent traveling, and various other aspects (Dijst et al. 2023). In their study, insights from geography (Kamruzzaman et al. 2011; Martín, Paéz 2019; Eldeeb, Mohamed, Páez 2021), economy (García-Sierra, Van den Bergh, Miralles-Guasch 2015), sociology (Cairns et al. 2014), and psychology (Van Acker, Van Wee, Witlox 2010) are partially applied. The approaches of the different disciplines to the problem of travel behaviour indicate the field's diversity and complexity. Studies analysing travel behaviour can be used mainly in spatial planning, transport planning, and local and regional policy. Therefore, knowing the complexity of human movement in space has a broad application in practice.

Research on the travel behaviour is one of the traditional research topics in geography and spatial planning. However, due to its complexity, it is strongly linked to the availability of data sources. Until recently, the opportunities for studying travel behaviour have been relatively limited. However, research on travel behaviour is currently undergoing a significant transformation thanks to new technologies and methods of data collection and analysis (Chen et al. 2016).

Population censuses and sample mobility surveys are the usual data sources on the travel behaviour. They provide valuable information on population mobility and travel behaviour, also available in time series. Probably the most widely used source of information over the long term is information on residents' commuting patterns, which provides area-wide mobility characteristics, including some basic aspects of travel behaviour (Daisy et al. 2018). Over time, criticism of them grew stronger since they became somewhat less informative. Sohn (2005), for example, argues that commuting data do not necessarily reflect the complex relationships

in an area and thus have partially limited validity. Andersen (2002) also notes that using commuting data to define administrative regions is questionable. In the last fifteen years, new data sources have become more common in spatial mobility research. These include, for example, big data from mobile phones and GPS devices, which provide very accurate geolocation data on population movements (see e.g. Halás et al. 2021; Marada et al. 2023; Zévl, Ouředníček 2024). With the help of computational algorithms, this data can be used to extract information on the transport mode used, the frequency of journeys, their length, and their trajectories. However, there are disadvantages such as the limited possibilities of constructing long-term time series, data availability, acquisition costs, or legal data protection aspects. Other suitable tools with great potential for studying travel behaviour include real-time navigation data (Krause, Zhang 2019), intelligent transport systems data (Kraft et al. 2022), crowdsourcing data (Kraft et al. 2024), and participative research data (Liu et al. 2023). While these recent technologies and data sources provide many benefits, traditional data sources remain reliable indicators of human mobility and travel behaviour.

The travel behaviour is influenced by many underlying factors. Various technological innovations are also changing travel behaviour. For example, while the 19th and early 20th centuries saw major changes in the population's mobility through the development of rail transport, the second half of the 20th century was strongly influenced by the rise of the cars and aircrafts. Widespread car ownership has become a major factor in the development of individual mobility, including the expansion of road infrastructure and related changes in the distribution of socio-economic activities in space (e.g. the development of suburbanisation processes and the spatial deconcentration of socio-economic activities in urban regions, see e.g. Bontje 2001). The expansion of the passenger car has affected all areas of the world at different times and intensities (Farber, Páez 2009).

In developed Western countries, the growth in the car's importance and a relatively significant decrease in the importance of public transport has been particularly rapid. However, current trends in travel behaviour are partly changing. Some researchers note that the younger generation in particular exhibits some differences to previous generations (Delbosc et al. 2019). The specifics of the younger generation's travel behaviour include less interest in car ownership, a preference for public transport and alternative mobility modes, a more frequent use of technologies facilitating mobility (car sharing, bicycles, etc.), and an emphasis on sustainable transport modes. These aspects indicate the potential for future transport system planning.

Although the above trends have been characterised as global, many areas still exhibit some transport particularities. For example, Central European countries show some specificities in travel behaviour compared to other countries. Travel behaviour in Central European countries (Czechia, Slovakia, Poland, Hungary)

has some common features but also some specific differences (Haustein, Nielsen 2016). These are former socialist countries, which has partly shaped the travel behaviour of their populations in the past and today. A relatively well-developed public transport network is typical for these countries, which is a consequence of its preference during the socialist period. During the centrally planned economy (second half of the 20th century), car ownership was artificially hampered. By contrast, public transport has been strongly promoted, and this has resulted in its very good performance, both in the extent of its network and the frequency of connections. Public transport was based on the traditional combination of buses and trains, supported in cities by an extensive urban transport network (urban buses and rail vehicles). Since the fall of socialism, there has been a relatively large-scale reduction in public transport, but it still retains a relatively strong position (Horňák, Kraft 2015). The growth of cars was also related to this phenomenon. For example, in 1990 there were 233 cars per 1,000 inhabitants in Czechia, while in 2024 there were 608 cars per 1,000 inhabitants. Similar developments can be observed in other Central European countries (Bartosiewicz, Pielesiak 2019; Horňák et al. 2023). Some researchers also note growing regional differences in travel behaviour between urban and rural areas. While large cities are experiencing higher levels of travel by high-quality urban transport and the development of sustainable transport modes, rural areas have seen a large increase in the car's importance in recent years (Pucher, Buehler 2005). This is caused by the remoteness of rural areas from urban agglomerations, but also by less available public transport. Moreover, in Czechia, the combination of these factors applies in areas of the so-called inner periphery, which are heavily dependent on car transport (Marada et al. 2013; Marada, Květoň 2016; Tagai et al. 2018). However, given the relatively rapidly aging local population, ensuring mobility and mitigating social exclusion is already a major challenge for regional planning.

3. Data and methods

To analyse the spatial patterns of travel behaviour in Czechia, we used data on the transport modes utilised for commuting to work trips. This is the only nationwide source of information on the population's mobility, including partial aspects of the population's travel behaviour. Another advantage is the large territorial detail (6,250 municipalities in Czechia) and the possibility to construct a long-term time series (as early as 1961). The last two censuses from 2011 and 2021 were analysed. In the census, residents reported, among other information, the location of their residence and their workplace, and the main transport mode used for commuting. Only regular trips to work in both survey years were analysed. This eliminated school trips, which are specific to young populations with limited transport mode

choices. However, the range of databases remains large; the 2011 census contains mobility data for 1,810,349 inhabitants, while the 2021 census contains data for 2,029,425 inhabitants. In both cases, this is a sufficiently robust sample that provides very accurate data on the spatial patterns on the Czech population's travel behaviour. The data from both censuses is highly comparable, but it should be noted that these sources are not completely identical. The ways of collecting and structuring the information also differ in the two censuses (more on the comparability of previous datasets on commuting see Tonev 2013). Between the two censuses there was a change in the methodology for recording transport modes used. In 2011, respondents could only report one main transport mode for their commute. This option did not allow to capture real-life situations (e.g. combination of multiple modes). In 2021, respondents could now indicate a combination of up to three different transport modes. However, the entry was a multi-stage question where the order of transport modes was to be determined according to their use in the commute. For comparability of results, we analysed only the most important (i.e., first in order) transport mode for commuting in 2021.

Changes in the spatial patterns of the main transport mode use are assessed in the spatial patterns' sub-analyses. These are buses, trains, public transport, and cars in both years under study. In the car category, passenger counts in the car-driver and car-passenger categories were combined to capture the real importance of the mode. Other transport modes (bicycle, motorcycle, walking, not detected, and others) were not analysed but were counted in the total number of detected commuters. Therefore, for each community, the importance of a given transport mode was determined using the following formula:

$$T_i = \frac{V_{i,m}}{\sum_{m=1}^M M_{i,m}}$$

T_i is the importance of the mode in municipality i ; $V_{i,m}$ is the number of inhabitants in municipality i who use the mode m , $\sum_{m=1}^M M_{i,m}$ is the total number of municipality i inhabitants who commute by all transport modes (where M is the total number of different transport modes).

The synthesis of the partial analyses is the final typology of municipalities according to the population's travel behaviour. This takes into account the relative proportionality of car transport and public transport's importance (the sum of the categories bus, train, and public transport). The typology expresses the relative importance of these two main transport modes for each municipality. It is based on the statistical distribution of the set of values for the importance of car and public transport in each municipality. The cutoff values were always the median shares of car and public transport in all modes used for commuting in 2011 and 2021, respectively. In 2011, the median share of public transport was 18.75% and 66.67% for car transport in all modes. In 2021, these values were 12.79% for public

transport and 78.64% for car transport. Each municipality was therefore assigned to the appropriate quadrant based on its relative importance in these two basic categories (Fig. 1).



Fig. 1 – Statistical distribution of municipalities by typological categories

4. Spatial patterns of travel behaviour in Czechia

The use of individual transport modes in Czechia is highly differentiated. It is conditioned by many factors, the most important ones being the transport location of the municipality, population size, transport infrastructure facilities, and cultural factors (see e.g. Marada, Květoň 2010; Ivan et al. 2019). In general, between 2011 and 2021 there has been a decline in the importance of public transport and an increase in the importance of the car. This can be illustrated by the general statistics, where in 2011 public transport accounted for 39.6% of passenger transport performance, while car transport accounted for 60.4%. In 2021, the share of public transport in passenger transport performance was only 21.2%. However, the impact of the COVID-19 pandemic needs to be noted here (although respondents were asked to respond to the situation in normal non-pandemic times). By comparison, in 2019 the public transport share was 37.2%, and in 2023 (the latest known value) the share was 30.0% (Transport Yearbook 2023). Nevertheless, the COVID-19 pandemic has negatively affected the use of public transport, which may partly influence the results. On the other hand, it can be assumed that the pandemic affected Czechia on a widespread basis, i.e. with a relatively uniform and temporary diversion of passengers from public transport.

The use of bus services decreased between the years analysed. However, among all public transport modes, bus commuting is the most stable. Buses appeared as the main commuting mode 9% of the time in both 2011 and 2021. In terms of spatial trends (Fig. 2 and Fig. 3) we can observe an overall reduction in the importance of bus transport (especially in small peripheral municipalities). These were mainly municipalities outside the railway lines in the more remote peripheral regions (Jeseník, Blansko, Žďár nad Sázavou). Nevertheless, in many rural areas, it is an important transport mode used for the inhabitants' regular transport to commuting centres (Marada, Květoň 2010). A specific feature of the municipalities with more important bus transport is their population size. Bus transport is important especially in population-larger and compact (Moravian) municipalities (outside railways). These can be efficiently served by bus transport.

Between 2011 and 2021, there has been a relative increase in the use of the train as the main transport mode for commuting. Whereas in 2011 only 3% of commuters used the train, in 2021, its share increased to 6%. Despite this relatively marginal share, the importance of train transport is likely to be even higher due to the pandemic's impact on data collection in 2021. This assumption can also be supported by the steadily increasing performance of rail transport, which accounted for almost 8% of transport performance in 2023. In terms of spatial organisation (Fig. 4 and Fig. 5), rail transport is spatially highly selective, and its use has a distinct linear character. The importance of railways increased mainly in the metropolitan regions of Prague and Brno, where rail transport has become

the backbone of integrated transport systems (Seidenglanz, Nigrin, Dujka 2015; Kraft, Blažek, Marada 2022). The importance of rail transport in transport services is thus increasing, especially in the hinterland of Prague and Brno (and other larger cities), where it is used as high-capacity support for daily commuting links (Seidenglanz et al. 2021).

The largest reduction in all transport modes can be observed in urban transport. In Czechia, it serves urban and suburban areas efficiently and has a very long tradition. Although it can be seen as key to intra-urban and suburban mobility in many regions, its importance has decreased from 18% (2011) to 5% (2021). The real decline in the importance of public transport can also be illustrated by the fact that its share is most evident during the COVID-19 pandemic. While other public transport modes also experienced a decline in transport performance during the COVID-19 pandemic, public transport was at 52% of the value of transport performance in 2023 compared to the pre-COVID-19 year of 2019. Bus transport is at 86 percent of the pre-COVID value of transport performance, and rail transport is at 93 percent (Transport Yearbook 2023).

The decline in urban transport's importance is also evident in the cartographic visualisations (Fig. 6 and Fig. 7). It is particularly evident in the large Czech cities (Prague, Brno, Ostrava, Pilsen), where the importance of urban transport has declined by almost three quarters on average. The main reasons for the declining importance of urban transport in the Czech transport system are the continued increase in car traffic, the deterioration of the availability and supply of urban transport connections (e.g. due to a lack of bus drivers), the development of alternative modes of urban mobility (bike, scooter or car sharing), or congestion negatively affecting the speed of urban transport travel. In line with Choudhury (2022), it can also be assumed that during the COVID-19 pandemic there was a partial change in work habits (working from home, flexible working hours), which may have led to a further reduction in interest in urban transport by regular commuters. On the other hand, we can observe a strengthening of the role of urban transport in the hinterland of large cities (especially their suburban zones). Here, the importance of urban transport has increased substantially, especially due to the expansion of integrated transport systems (see also Štastná, Vaishar, Stonawská 2015).

The most significant increase in importance can be seen in car transport. While in 2011, almost 49% of commuters chose the car as the main transport mode for commuting, by 2021 their share increased to 73%. There is a nationwide increase in the importance of cars; however, the traditional west-east gradient is maintained, whereby municipalities in the western parts of Czechia have a higher share of cars than municipalities in the Moravian and Silesian regions (Fig. 8 and Fig. 9). This polarity is evident in both years analysed. The main reasons for these differences can be attributed to the higher motorization of households in Czechia (Kraft, Prener 2014), differences in the regions' settlement structure (higher

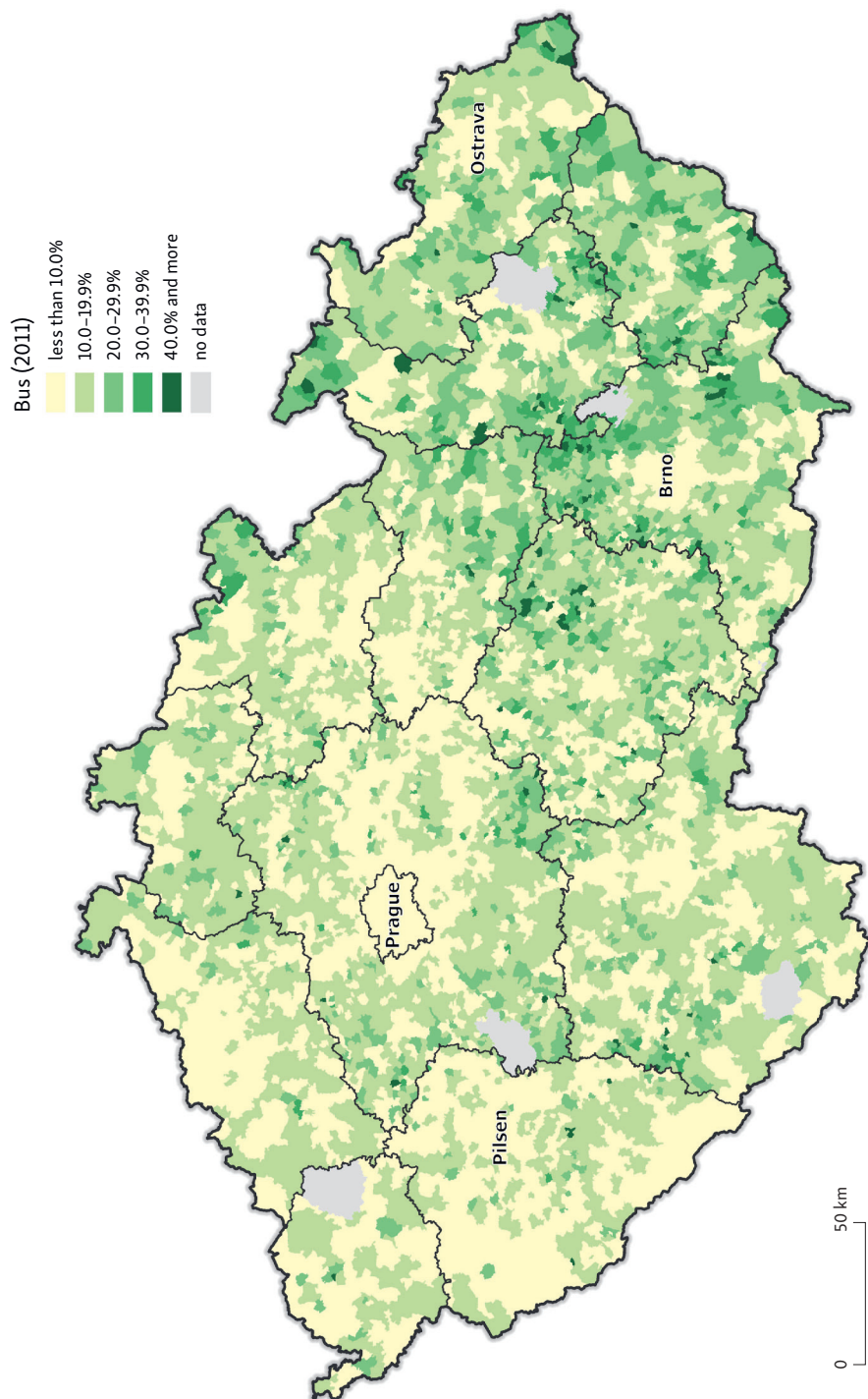


Fig. 2 – The use of the bus as the main transport mode for commuting to work in 2011

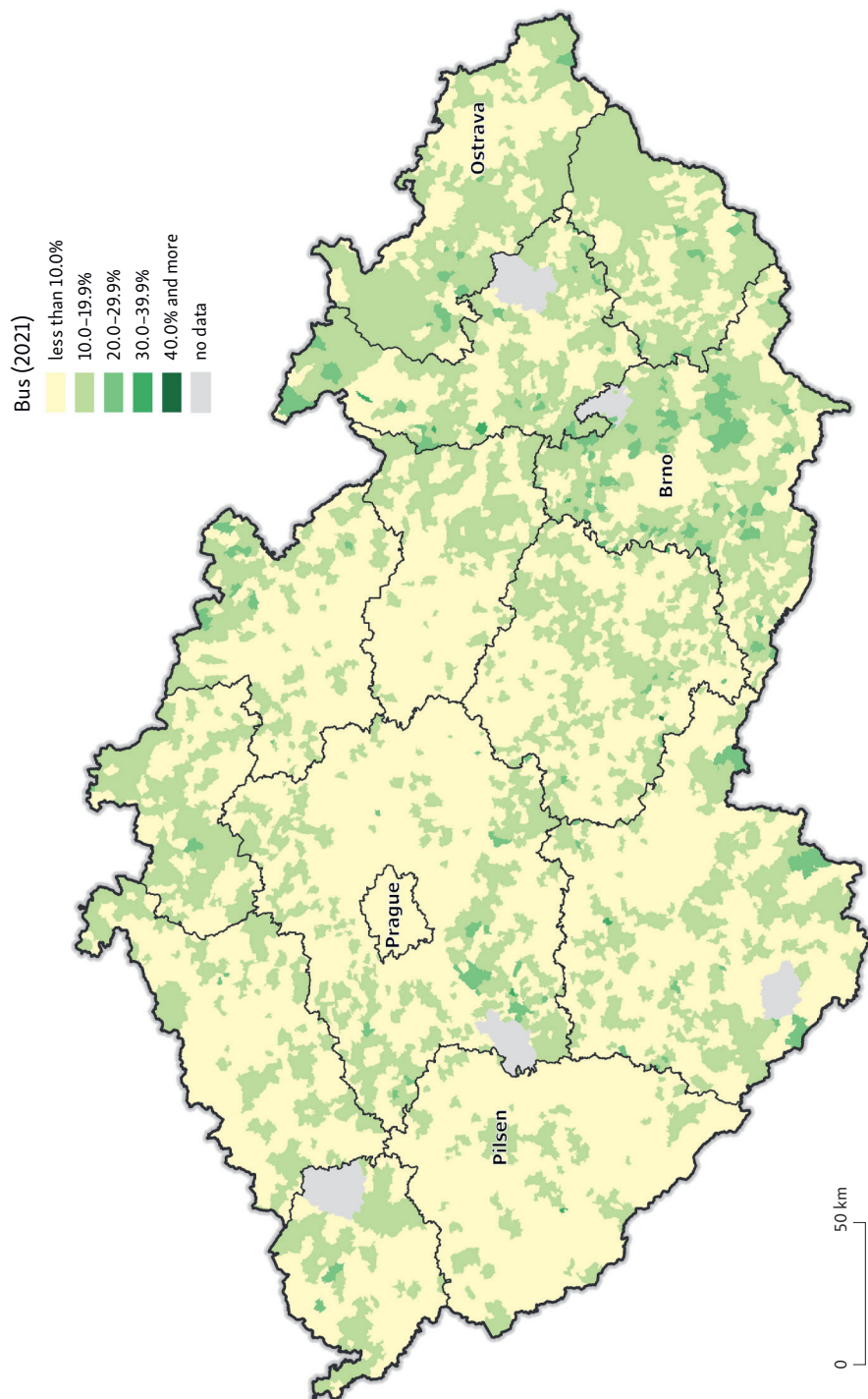


Fig. 3 – The use of the bus as the main transport mode for commuting to work in 2021

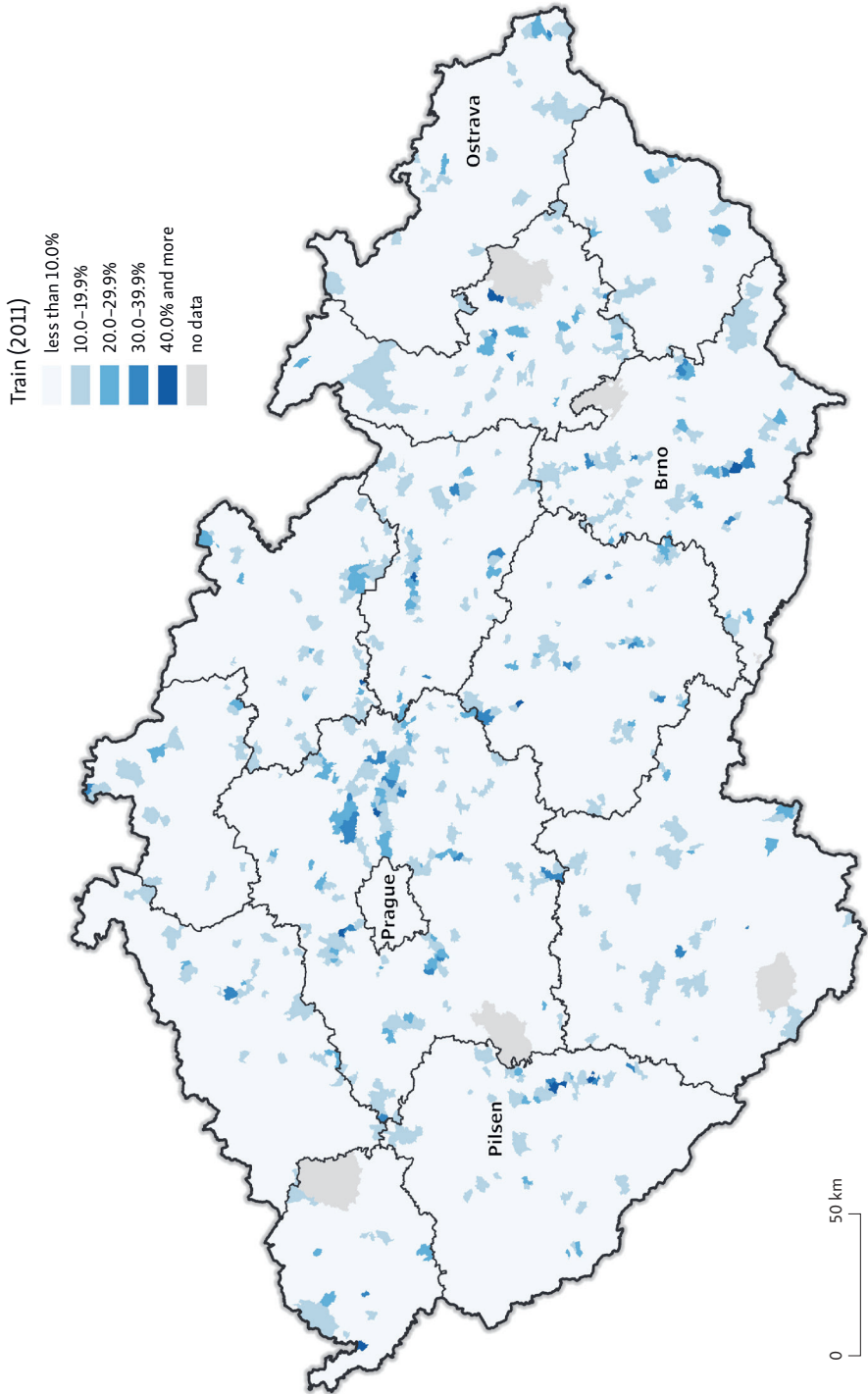


Fig. 4 – The use of the train as the main transport mode for commuting to work in 2011

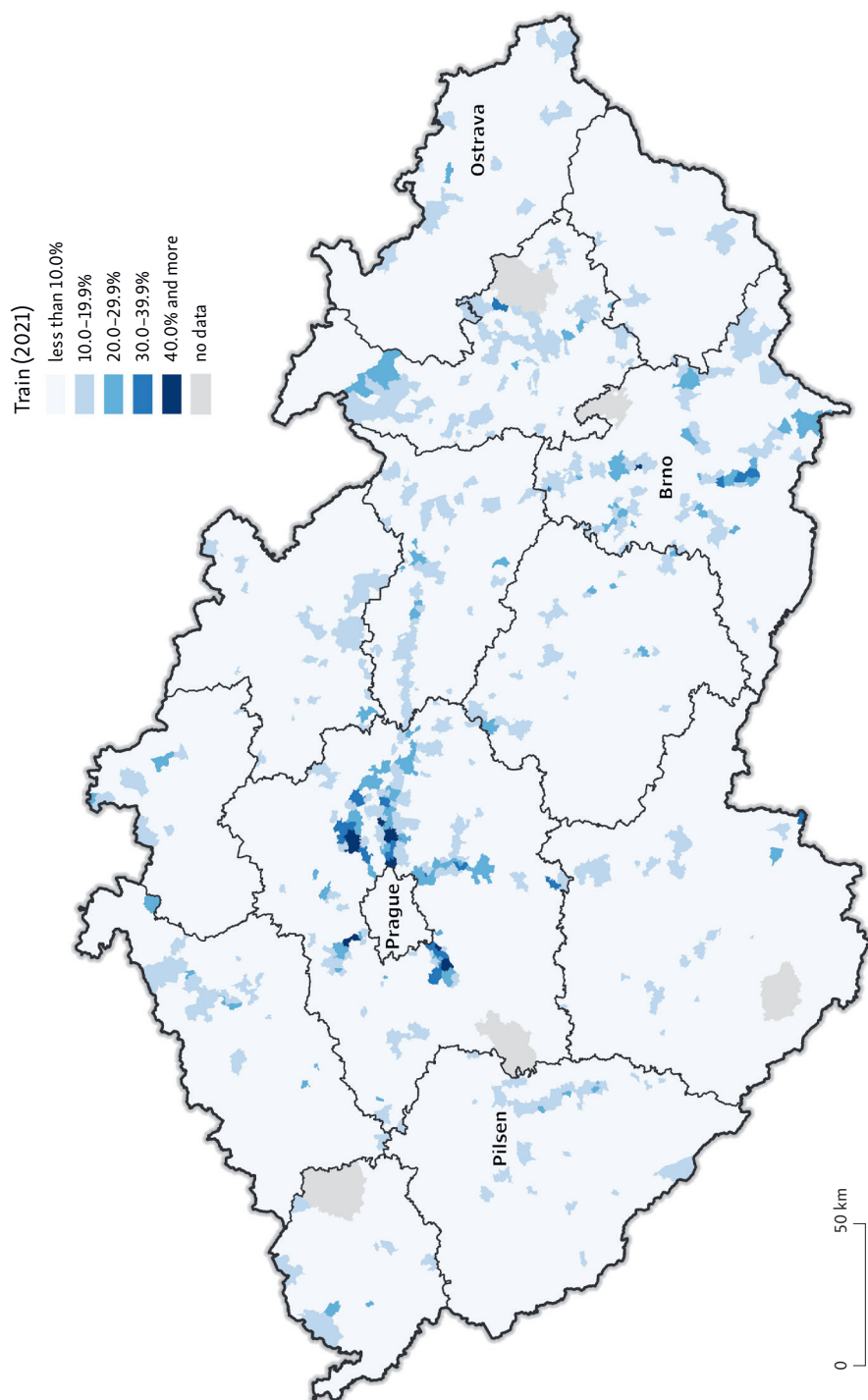


Fig. 5 – The use of the train as the main transport mode for commuting to work in 2021

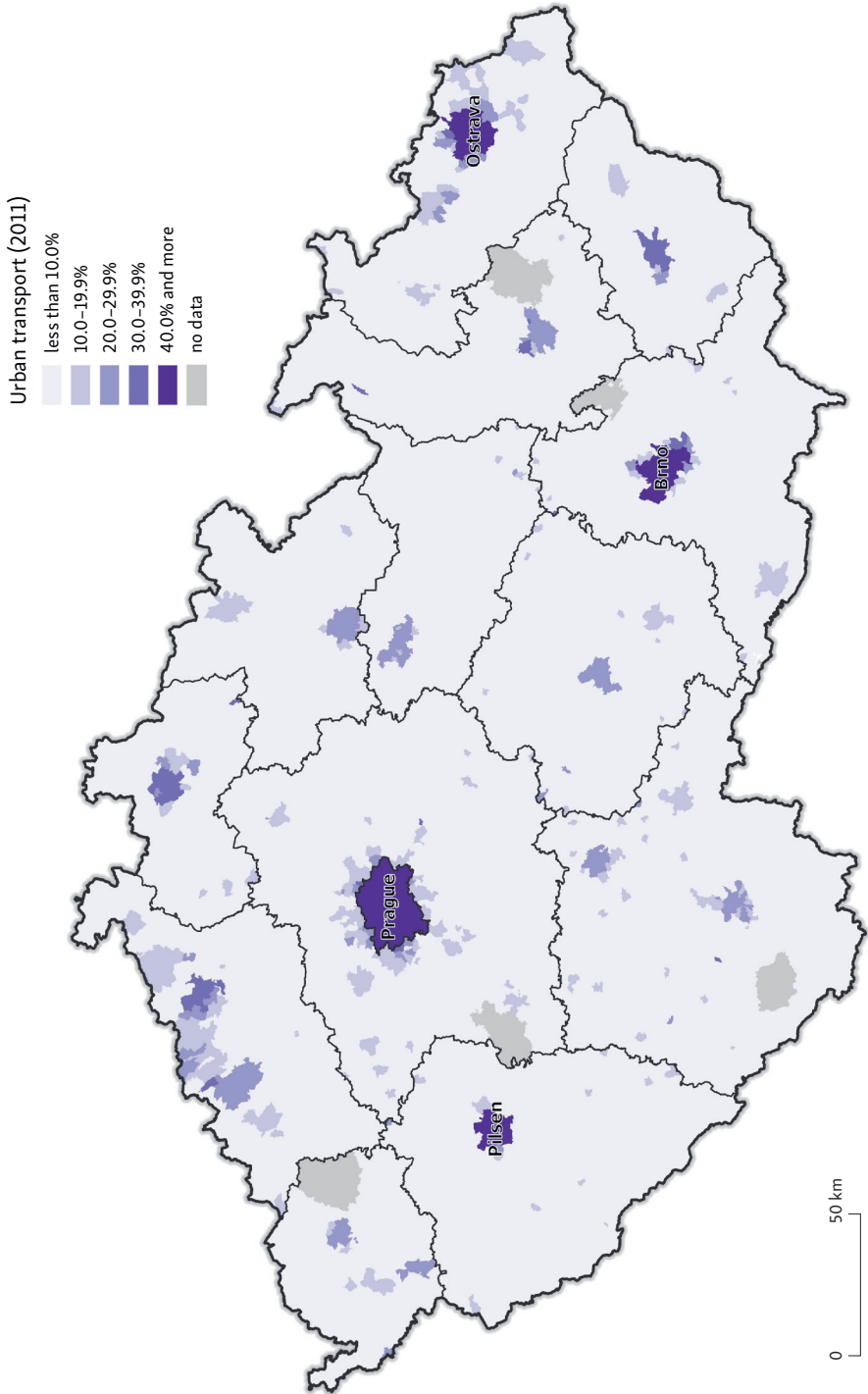


Fig. 6 – The use of urban transport as the main transport mode for commuting to work in 2011

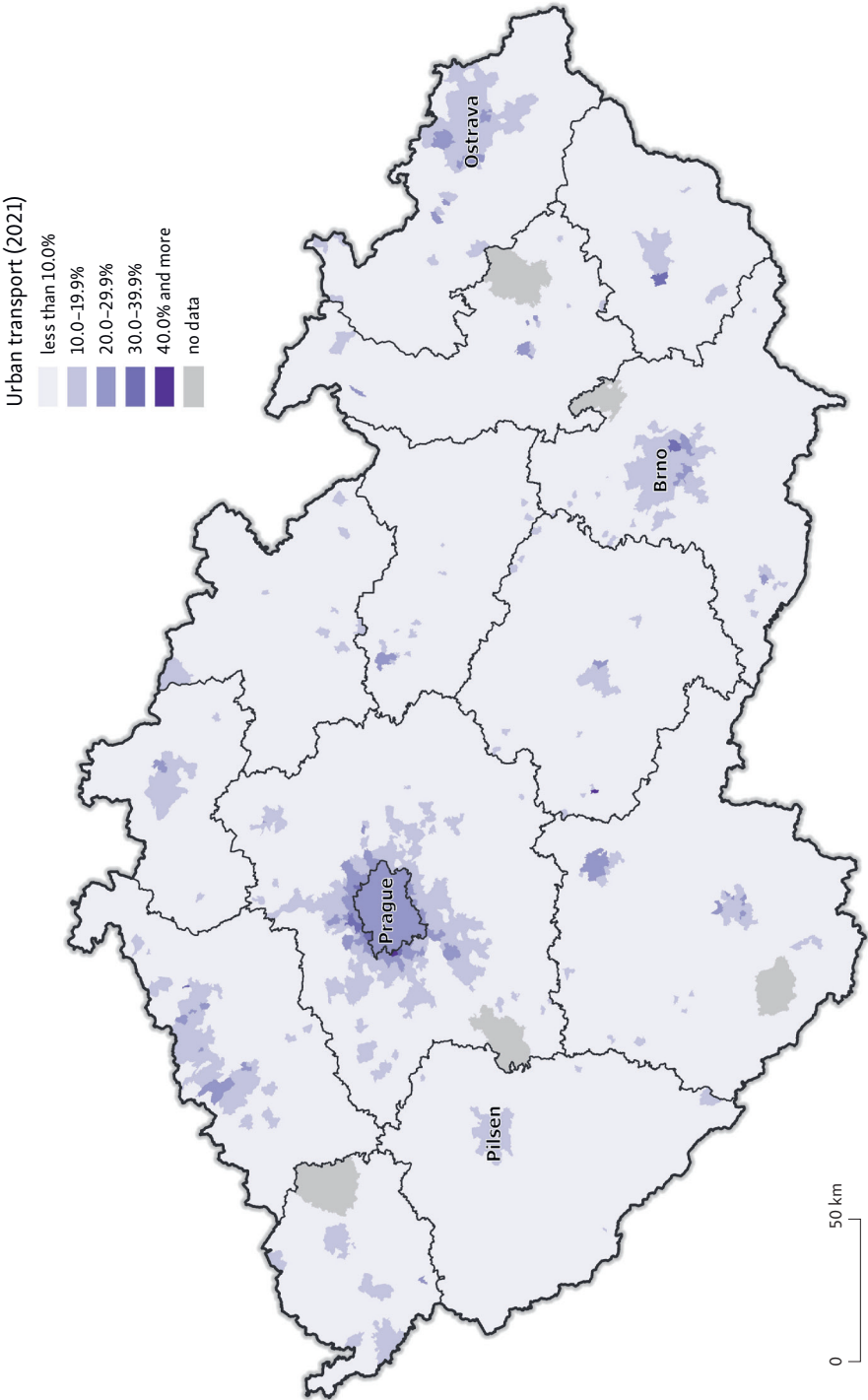


Fig. 7 – The use of urban transport as the main transport mode for commuting to work in 2021

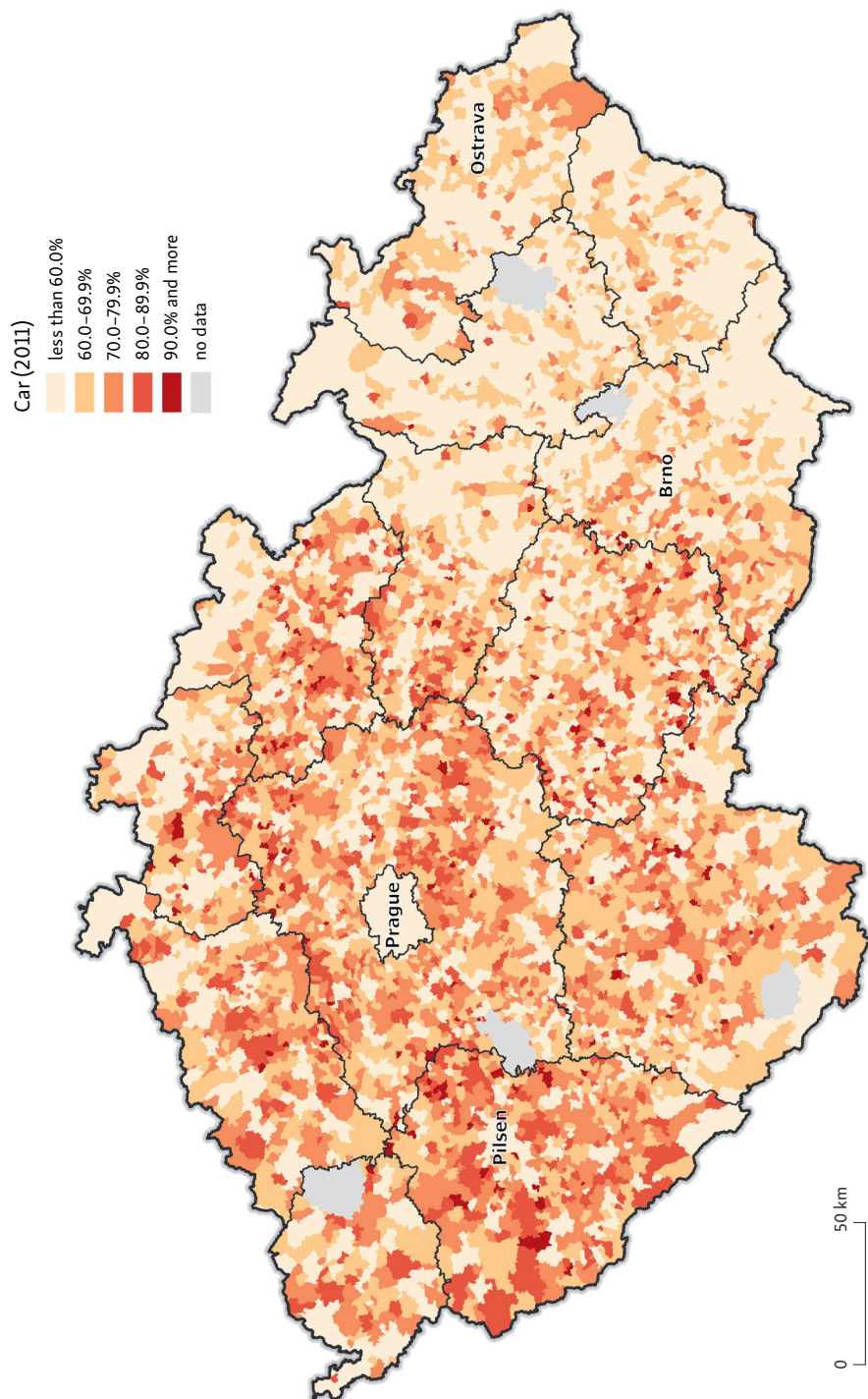


Fig. 8 – The use of the car as the main transport mode for commuting to work in 2011

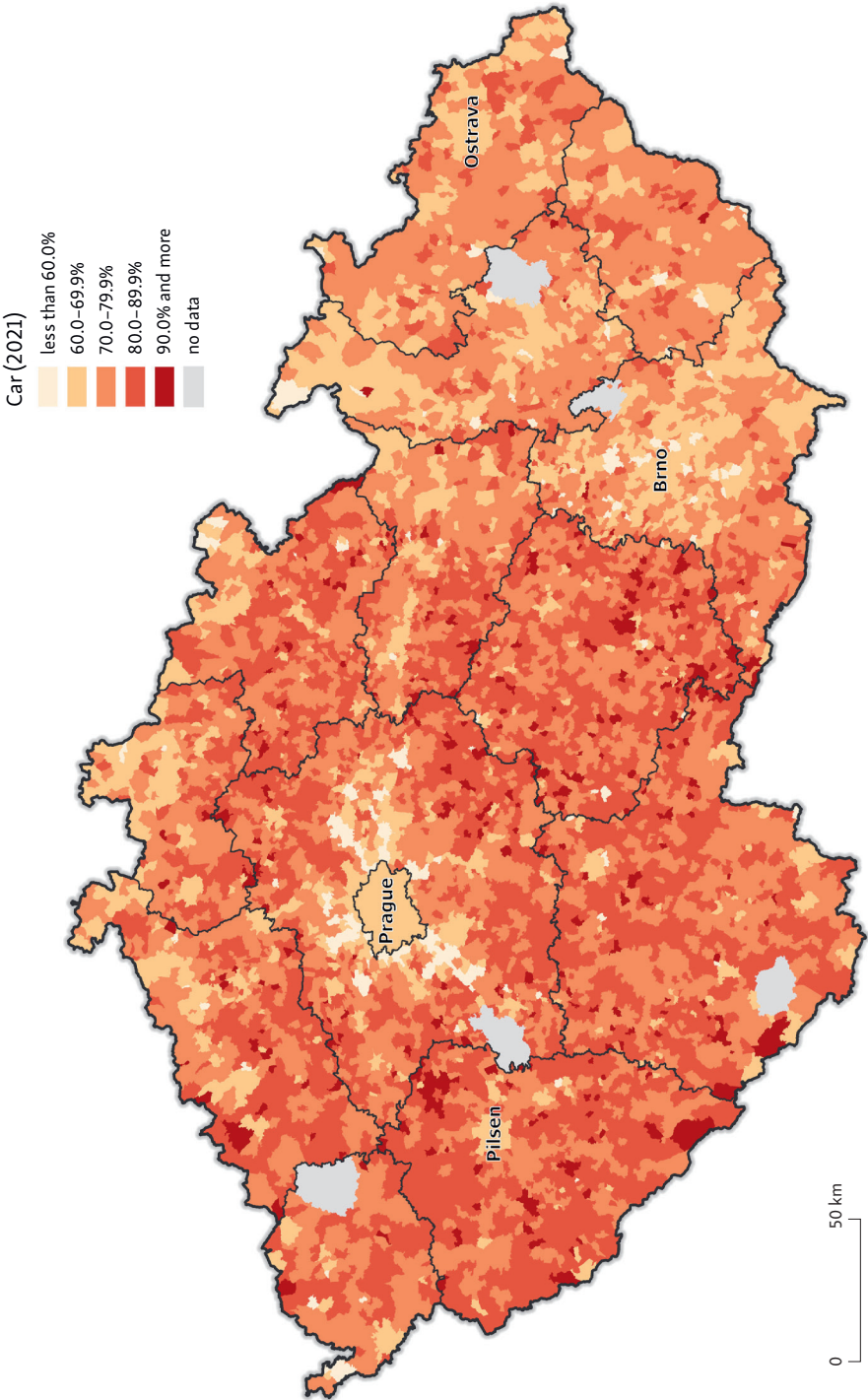


Fig. 9 – The use of the car as the main transport mode for commuting to work in 2021

car use in regions with less concentrated population vs. lower car use in larger municipalities in Moravia), the supply of public transport associated with the use of integrated transport systems (see e.g. the border between Vysočina and Jihomoravský region), or cultural differences, which are reflected, among other things, in the willingness to adopt mobility trends from more developed Western regions (Marada et al. 2013). The relatively highest increases in car use can be seen in smaller municipalities and less urbanised regions (e.g. Vysočina Region), where car use has sharply increased. In many ways, a paradoxical situation can be observed in the central part of Czechia (especially in the vicinity of Prague), where the relative importance of the car as the dominant transport mode for commuting decreased. There are clear lines with relatively lower importance for cars along the main railways coming out of Prague. Here, restrictive measures (e.g. introducing parking zones for Prague residents), more congestion, and the introducing active support for public transport (P+R parking, integrated transport systems) have caused a certain reversal in the development of the Prague metropolitan region's population's travel behaviour. This effect is also partially observable in the vicinity of other large cities (Gorný 2024).

Partial results from previous analyses have shown continuing changes in the Czech population's travel behaviour, which can be roughly characterised by the continued dominance of cars in the population's commuting and a certain reduction in public transport. The key point, however, is that many of the changes are highly spatially selective, which legitimises geographical approaches to studying this phenomenon. However, reverse trends are also emerging, with a relative decline in the importance of cars in certain regions. To synthesize the relationship between public and car transport in individual regions, a typology of municipalities has been created according to the relative proportionality of the public and car transport importance. In addition to these modes, other modes of transport (bicycle, walking, motorcycle, etc.) are also involved in the overall commuting pattern.

Type A is characterised by an above-average share of public transport and a below-average share of car transport. Inversely, Type D is characterised by a below-average share of public transport and an above-average share of car transport. Types B and C are intermediate categories. Type B includes municipalities with an above-average share of both public and car transport (i.e. with a very low representation of other transport modes), and type C represents municipalities with a below-average share of both public and car transport (and a relatively high importance of different transport modes).

The year 2011 is characterised by a relatively large mosaic of municipalities belonging to different types. This is visible in Table 1. Most municipalities are concentrated in types A and D. Type A municipalities are concentrated mainly in Moravia, where public transport has traditionally played an important role. This

Tab. 1 – Basic features of transport typology categories

Type	Number of municipalities (2011)	Average population size (2011)	Number of municipalities (2021)	Average population size (2021)
A	2,192	2,988	2,591	3,370
B	940	496	534	849
C	859	2,990	527	502
D	2,258	435	2,594	428

is true despite the relative decline in its importance between the years analysed. These municipalities are also more concentrated in Bohemia, especially in the more populated urban regions. This category is characterised by a higher average municipality population size (this is also true for 2021). Type D represents municipalities strongly preferring car use and are significantly less oriented toward public transport. These are predominantly smaller municipalities concentrated mainly in the peripheral areas of Czechia. A more pronounced representation of these municipalities is typical for areas of western Bohemia with a dispersed settlement structure, where there is usually a limited offer of public transport connections. Type B is the least concentrated category. These are usually smaller municipalities in the strongly peripheral regions of Czechia, from where residents have to travel longer distances to work (Pileček, Chromý, Jančák 2013). The highest average population size is typical for Category C municipalities, where other transport modes are more prevalent, reducing the importance of public and car transport. These are larger municipalities with a sufficient supply of jobs. Commuting to work is mainly short distance, with a greater use of walking and other transport modes.

The transport typology in 2021 shows different characteristics. There has been a significant reduction in the number of municipalities in categories B and C, and their transfer to categories A and D. Therefore, we can confirm the growing polarity between regions with a significant share of public transport and regions with a significant share of car transport. (Fig. 10 and Fig. 11). This development is conditioned by the widespread increase in the importance of the car when commuting to work, the development of innovative public transport concepts such as integrated transport systems, the development of intermodal transport (e.g. P+R parking lots), but also by declared changes in the distribution of jobs and changes in commuting flows (Hampl, Marada 2015; Halás, Klapka 2024). Interestingly, however, this growing polarization in travel behaviour in Czechia is strongly regional, as in 2021 the transport typology is creating large homogeneous areas. Municipalities falling into category A with a significant share of public transport and a smaller share of cars are traditionally concentrated in Moravian areas (with a greater railway network density and a large offer of public

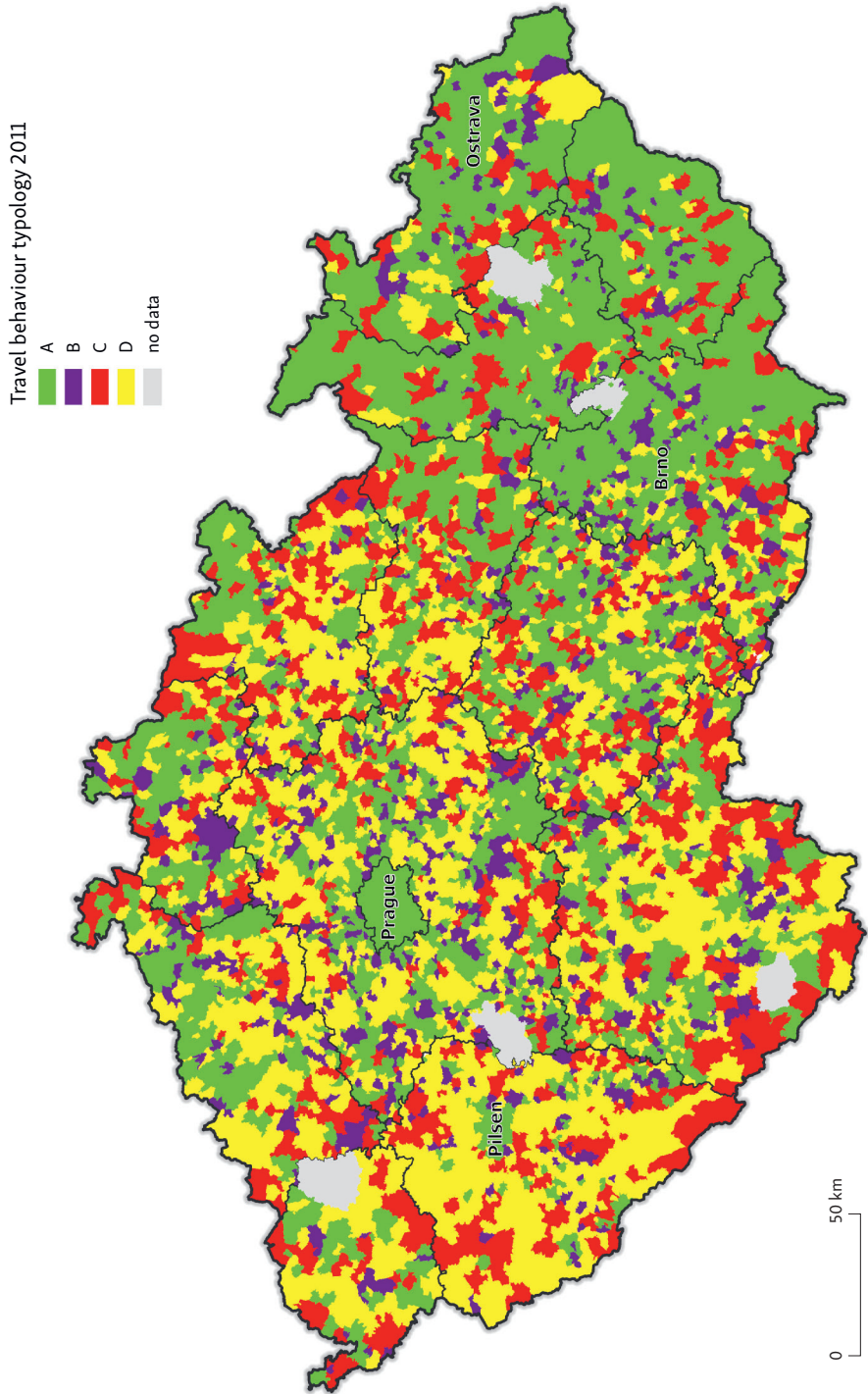


Fig. 10 – Transport typology of Czech municipalities in terms of travel behaviour in 2011

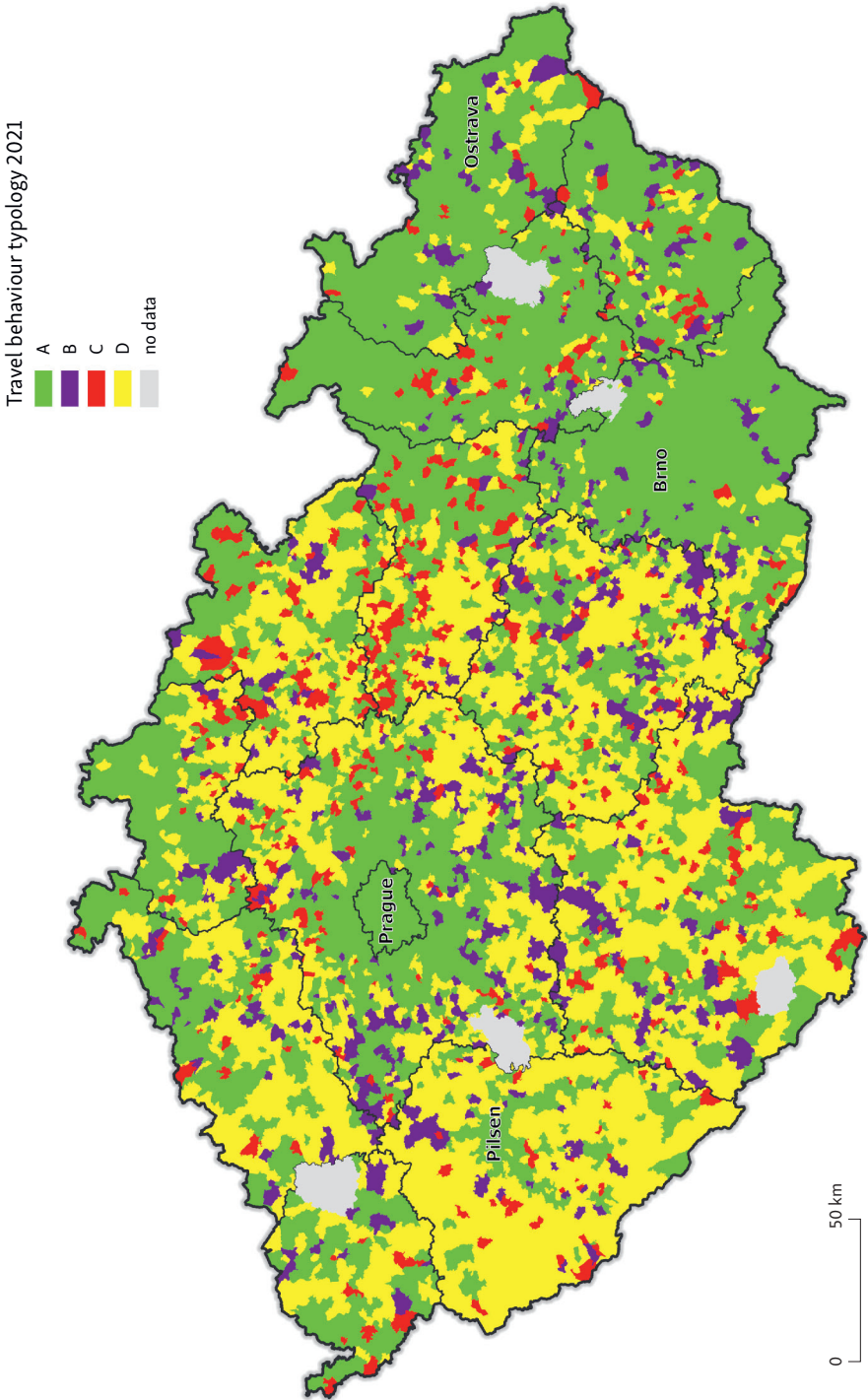


Fig. 11 – Transport typology of Czech municipalities in terms of travel behaviour in 2021

transport connections). This situation is fundamentally influenced by the nature of the settlement system. Again, the size, compactness and facilities of Moravian municipalities should be mentioned here. Recently these municipalities are also in Bohemia, especially in large settlement centres and their hinterlands. This is evident, for example, in Prague and its metropolitan region, where a significant part of the municipalities falls into type A, while in 2011 this region was highly heterogeneous. In 2011, municipalities in D category were even more concentrated in non-metropolitan and especially peripheral regions, where the car is the dominant transport mode for commuting. Again, this is the category with the lowest average population size (428 inhabitants), indicating their significant concentration in smaller settlements outside the main urbanized regions. This category also tends to create relatively large homogeneous units in 2021, significantly polarizing the territory of Czechia in terms of travel behaviour. Although these tendencies have already been indicated in earlier studies (Seidenglanz 2007; Marada, Květoň 2010, and others), only in the analysed period did a significant polarization of these relationships occur.

5. Conclusions

Research on travel behaviour provides valuable data on general changes in the population's spatial mobility. The indicated development trajectories are therefore important to understand the spatial patterns of travel behaviour and its development. This is a complex issue and the changes in the use of transport modes for the population's commute to work observed above constitute only a part of the travel behaviour. It is still very important as it provides valuable information for transport planning, management, and optimisation. The results can be used primarily for the targeted reduction of traffic load and congestion, improving the quality of transport infrastructure, further increasing traffic safety, and supporting sustainable mobility and more efficient public transport. Czech transport policy has also long been trying to achieve these goals.

The travel behaviour of the Czech population has been changing in recent years depending in part on geographical and socio-economic factors. The most significant ones are urbanization and especially suburbanization processes, which lead to more frequent transport infrastructure overload, especially around large cities. On the one hand, suburbanization supports the use of car transport, however, it is evident that the most suburbanized regions have recently significantly increased the use of public transport. However, studies in other Central European countries show that the trend there is more towards increased car use in suburban areas (compare e.g. with results by Wolny 2019; Klapka, Kraft, Halás 2020). The main changes in transport modes can be characterized by the strengthening of the

role cars play in commuting and significantly differentiated changes in the use of public transport. The previous decline in public transport's importance has stopped in recent years, and on the contrary, some public transport modes have begun to significantly strengthen their position in the Czech transport system. For example, railway transport significantly strengthened its role between 2011 and 2021, especially in the hinterland of metropolitan centres. This confirms the trend of the great potential of railways in the hinterland of large cities (García-López, Pasidis, Viladecans-Marsal 2024). This is due to ongoing support measures for greater use of public transport, especially the development of integrated transport systems and support for combined transport in the form of P+R parking lots, etc. Restrictive measures in large commuting centres (e.g. regulation of parking spaces) also contributed to the changes.

The transport typology partly indicates a decreasing transport heterogeneity in rural areas (for more details, see Seidenglanz 2007). The previously evident differentiated use of public transport is reflected in transport typology by its relatively higher use, which leads to a partial homogenization in the travel behaviour of the rural regions' inhabitants in the sense of its higher use. In absolute terms, the overall development is towards the ever-higher importance of cars; the relativized characteristics indicate a reversal of this development and the creation of a new dichotomy within rural regions. Suburban areas are starting to focus almost solely on a greater use of public transport, while more remote rural regions are increasingly dependent on cars (see also Šimeček et al. 2018).

Research on travel behaviour in Czechia will have to respond to current technological changes, demographic developments, and environmental challenges. The key issue will be the balance between efficiency, accessibility, and sustainability of transport, especially concerning cities, suburban areas, and the countryside. Future research on this issue can focus on rural regions and their sustainable mobility possibilities. This concerns the issue of reducing regional disparities and alleviating transport-related social exclusion of residents (Jaroš 2017). This issue is therefore of great importance for the future direction of Czech transport policy.

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