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DETERMINANTS OF DEMAND IN INDIVIDUAL TRANSPORT WITH PARTICULAR REFERENCE TO SPATIAL ASPECT

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Abstract. Mobility by individual transport is determined by many factors that influence the ownership and use of a car. These factors can be divided into categories related to: spatial structure, household socio-economic and demographic characteristics, situation associated with a given journey, including purposes of journey-making. The aim of the paper is to have a closer look at the aforementioned factors with particular reference to spatial aspect. The conclusions to the article underline that the traffic congestion increases and the quality of public transport improves with the growth of settlement network density, which results in a lower level of car use and lower level of motorization rate. This is particularly noticeable in large cities. In turn, in peripherally located rural areas, there is lack of alternative modes of transport, which, combined with longer travel distances to destinations, contributes both to increased motorization as well as to a relatively higher cars' mileages.

Key words: individual transport, spatial structure, motorization rate, car use.

Introduction

Mobility by individual transport is determined by a number of factors that influence both the ownership and use of a car. These factors can be divided into categories related to: spatial structure, household socio-economic and demographic characteristics, situation associated with a given journey, including purpose of journey and quality of road and public transport network. The aim of the paper is to have a closer look at the aforementioned factors with particular reference to spatial aspect. Current literature on the transport geography and sociology dedicated to factors influencing the transport mobility is very extensive, (e.g. Button et al. 1982; Ingram & Liu 1999; de Jong 1990; Dargay 2001; Downes 1980; Whelan 2007; Choo & Mokhtarian 2004; Frändberg & Vilhelmson 2011; Matas & Raymond 2008; Ewert & Prskawetz 2002; Polk 2004; Meurs & Haaijer 2001; Acker van & Witlox 2010; Maat & Timmermans 2009; Urry 2007; Komornicki 2011). However, only a relatively small number of papers are oriented around the spatial aspect as a determinant of demand in individual transport. The aim of the present paper is to have a closer look at this subject-matter in the universal dimension of people's behaviour.

This paper is based on the results of analysis carried out within the framework of the "Comprehensive Modelling of Passenger Road Traffic in Poland and Identification of its Local Socio-Economic Determinant Factors" project financed by funds of the National Science Centre on the basis of the decision DEC-2012/05/B/HS4/04147.

Spatial structure

In the current paper, the role of spatial structure, including the local conditions, in mobility associated with the use of private cars is a key question. Therefore, identification of factors determining the ownership and use of car was based in the first place on the study of spatial structure. The sequence adopted for this analysis results from the requirements of the present paper rather than the importance of factors.

The factors related to the spatial structure include:

– density of the settlement network,
– level of spatial peripherality,
– location of traffic production potential with regard to traffic attraction potential.

Density of the settlement network**.** The density of the settlement network, in the sense of the urbanization level, is an important factor determining both the level of peripherality, location of the potential of traffic production and attraction, as well as quality of transport networks. Urban population is characterized by higher income, which entails greater inclination towards vehicle ownership and higher estimation of travel time value, including commuting to places of work (Ingram & Liu 1999). However, higher density of the settlement network (cities/towns) is conducive to heavier congestion problems in general and to development of the higher quality of the public transport, thus translating into lower level of car use as well as into generally lower level of motorization (particularly in large cities) (Whelan 2007). The detailed statistics concerning these issues are contained in the *National Travel Survey*, i.e. traffic survey carried out in Great Britain on a yearly basis. Within the framework of this survey the respondents are questioned *inter alia* about a number of private cars in the household, average annual mileage by mode of transport and particular purposes of journeys. The results are presented *inter alia* by division referring to the density of settlement network, with distinguishing between the Greater London, metropolitan areas, cities by population size as well as rural areas (Fig. 1-3).

The conclusions drawn from the *National Travel Survey* report are as follows. Firstly, the differences in the level of motorization between metropolitan areas, especially Greater London, and rural areas are increasing – as a result, the number of cars in rural areas is twice as high as in the metropolitan areas (Fig. 1).

Secondly, in the rural areas, average annual mileage is also more than two times higher than that in Greater London and at the same time when car/van mileage is compared this gap is one to three in favour of rural areas! In the last decade, average mileage of car driver remained at the same level in the rural areas, whereas, as regards the metropolitan areas as well as primarily the Greater London (Fig. 2), this mileage was on the decrease. The share of car in transport performance increases as the settlement network density decreases (Fig. 3).

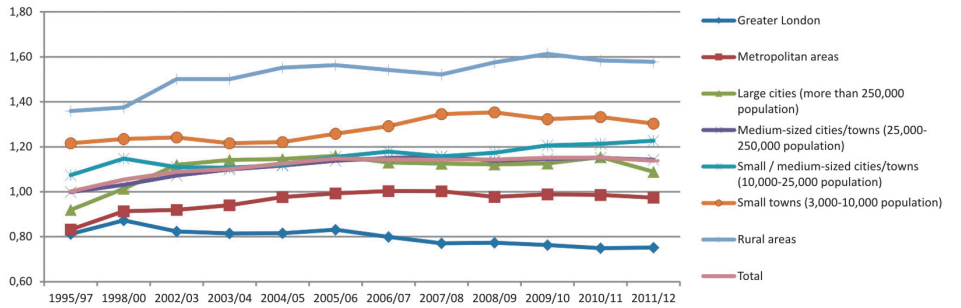

Figure 1. Number of private cars per household by place of residence in Great Britain in the years 1995-2012
Source: National Travel Survey https://www.gov.uk/government/statistics/national-travel-survey-2014.

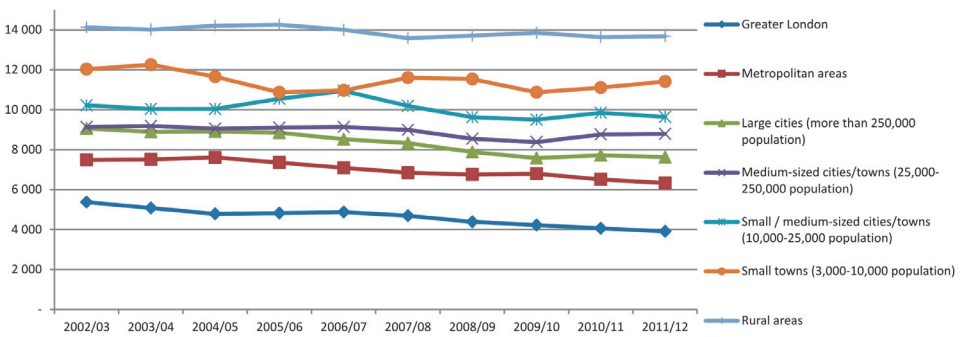

Figure 2. Average annual distance travelled by a household car by place of residence in the years 2002-2012 (kilometres per person)
Source: National Travel Survey https://www.gov.uk/government/statistics/national-travel-survey-2014.

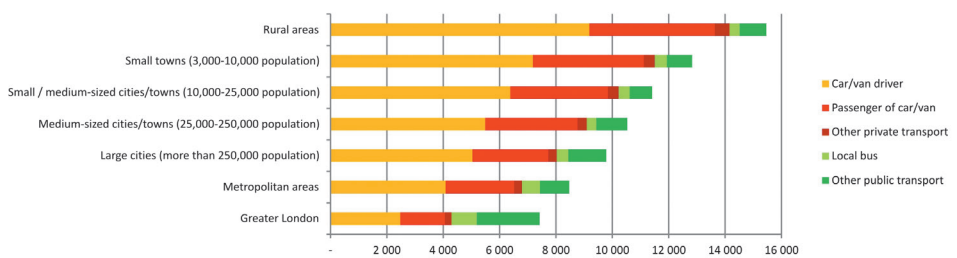

Figure 3. Average annual distance travelled by mode of transport and by place of residence in Great Britain as of 2010/2011 (kilometres)
Source: National Travel Survey https://www.gov.uk/government/statistics/national-travel-survey-2014.

Lower car mileages that are noted in the highly urbanized areas as compared to rural areas tend to corroborate the findings of a plenty of studies carried out in the West European countries. These differences, however, are not as spectacular as those shown by the traffic studies in Great Britain. As indicated by Menes (2014), based on the analysis of vehicles' mileages in accordance with the

drivers' place of residence in Switzerland and France, the lowest annual mileages (c. 12,000 km) are recorded in agglomerations, whereas in the rural areas these distances are adequately higher (amounting to even more than 14,000 km). In Germany, the similar results (from c. 13,000 km in cities of more than 500,000 of population to approx. 16,000 km in the sparsely populated areas) were obtained within the framework of the *Mobilität in Deutschland 2008* research carried out in 2008.

Level of spatial peripherality. Spatial peripherality, associated with settlement density and polycentricity of the cities' networks in a given country, is the reverse of transport accessibility. A high level of peripherality and poor accessibility that is associated with it, determines the need for travel (Whelan 2007). Low accessibility to the places-of-work and services, which takes place e.g. in the rural areas, is the factor which influences the need for the use of own car. Peripherality occurs in different spatial scales: from the level of macro-, through meso-, to micro-regional scales however the level of micro- can be understood either in global, continental, international (group of countries), national and even macroregional or regional sense, whereas the levels such as meso- and micro- are attempts to specify the level of peripherality at the lower spatial scales with regard to the defined level of macro-scale. Each time the center-periphery model can be analyzed from a perspective of a center, semiperiphery and periphery (Halás 2014).

Location of production potential with regard to traffic attraction potential**.** Location of the place of residence is of the key importance here (traffic production potential) in relation to the set of travel destinations (traffic attraction potential) and can be highly differentiated both according to quantitative features (determined primarily by density of settlement network and indirectly also by the scale of spatial peripherality) as well as to qualitative features. For example, in the case of longer trips, employees are willing to commute provided that they get better earnings in their places-of-work (Ewert & Prskawetz 2002; Maat & Timmermans 2009). In turn, as regards long-term residents living in attractive places, on the one hand they are less willing to travel by car for recreational/leisure and tourism purposes and on the other hand they tend to represent a wealthier and more mobile group of people (Meurs & Haaijer 2001; Ewert & Prskawetz 2002).

Socio-economic and demographic characteristics of households

The socio-economic and demographic characteristics of households that influence the real use of cars include (cf. Menes 2014):

- economic factors,
- demographic factors,
- sociological factors.

Economic factors. Among this category of factors one should mention primarily the household income in context of both income elasticity of demand for private cars as well as fuel (demand side).

The average household income (at the national, regional or local level) ought to be seen in relation to current car prices on the automotive market. The so-called elasticity of income demand is of great significance, especially in less developed countries, as perceived in the context of purchase of private car. The importance of this factor declines while analyzing interregional differentiation in highly developed countries that almost reached the saturation level (Dargay 2001; Button et al. 1982; Ingram & Liu 1999; Komornicki 2011). It needs to be underlined that car ownership (access to car/vehicle), measured as the rate (level) of motorization, is a necessary though insufficient factor

for assessing the real use of car (de Jong 1990; Acker Van & Wiltox 2010). In highly developed countries, only small part of population cannot afford to buy a relatively cheap char and lack of a car in a household is related primarily with the occurrence of factors of sociological nature.

However, average income of a household is a still important factor also in the highly developed countries in context of income elasticity of fuel demand, largely under conditions of long-term upward trends of fuel prices. This factor is differentiated according to spatial structure, being more important in large cities that struggle with traffic congestion. There seem to be very high costs of fuel in combination with parking fees that are imposed in agglomeration traffic mostly in the central zones of large cities. In turn, in rural areas a vehicle constitutes frequently the only possible mode of transport, and the costs of fuel consumption are relatively lower (Matas & Raymond 2008). As far as the use of car is concerned, the costs of fuel make up the dominant part of the overall car usage cost. In addition to fuel consumption costs, costs of car maintenance, insurance and repairs need to be taken into account (Whelan 2007). For example, in Great Britain, these costs have increased several times since the late 1980s, mostly the car insurance rates (more than fivefold increase) and car maintenance (fourfold increase, just as in the case of fuel costs). These upward trends of the aforesaid costs have been accompanied simultaneously by more or less stable prices of cars which have remained rather unchanged for a long time. Considering all these factors, not only car ownership, but also total distance travelled by car is strictly correlated with household income levels. In Great Britain in 2013, in households characterized by the highest income, annual distance travelled by car annually was running at 12,500 km, whereas people living in the households with lowest income had a car mileage in the order of 4,400 km per year (Understanding the drivers… 2015). Thus it is assumed that in the regions where a particularly high share of older cars is noted, the costs of car repair are also relatively higher, which may result in lesser inclination to travel by car and in lower mileage. It is pointed out that regional analyses need necessarily to take differentiations in general costs of living into consideration (Whelan 2007).

Demographic factors. Demographic structure, including size and structure of households, i.e. primarily age and gender as well as household members in the productive age, share of marriages with children and number of children influence both the car ownership and actual use of car (Matas & Raymond 2008; Whelan 2007; Ewert & Prskawetz 2002).

Age. Driving rights (driving license holding) is determined primarily by driver's age. With increase in age, also the number of cars in a household is growing (Button et al. 1982). It is assumed that the more households with children and the larger number of children in a household (a higher total fertility rate), the greater use of car, due to, among other things, necessity of driving children to school. With children growing older, also the number of cars is on the increase, because a person responsible for looking after the little children can return to work (Komornicki 2011). In turn, at a later stage of life (60+), it is noted that the more advanced average age of household members, the lower rate of car use. The older, i.e. retired persons are inclined to sell the second car in their household however the trend to decrease a number of household cars is lower than the previous increase (Downes 1980; Ewert & Prskawetz 2002; Polk 2004).

Gender. In turn, there is a traditionally lower level of motorization among females, but in the last few decades the gap in motorization between genders is becoming narrower, particularly among the young generation. In Great Britain in 2013, the study on the average annual use of car depending on age and gender showed that the markedly largest car driver mileages were among men aged 40-60. The most significant differences between genders are characteristic of older population group, among youth group these differences are hardly noticeable (*Understanding the drivers*… 2015).

Sociological factors. Factors of sociological nature include occupational prestige and social status, style of life, as well as customs, habits, needs and experiences associated with travelling. Prestige and social status are manifested by car ownership, especially in the countries characterized by lower average income, with the car fulfilling the role of a status symbol (Komornicki 2003, 2011; Hagman 2006). Style of life, in turn, determines, particularly among younger population of large cities in well developed countries, the attitude to car ownership (or rather to lack of access to car) (Choo & Mokhtarian 2004; Frändberg & Vilhelmson 2011). Young people have a greater willingness to adopt an ecological lifestyle. This process has led in many countries of West Europe to the decrease of motorization and car use in recent years. However, it is difficult to reveal thus far how important the factors such as financial crisis, life instability, difficulties with finding permanent job as well as indirectly high fuel prices were in bringing about the aforesaid change. For example, in 2015, the United States (the country which managed to overcome the financial crisis much faster than the European countries) witnessed rapid increase in the annual average distance travelled by car per capita. Also, there was a significant growth in sale of new cars. Moreover, such factors as customs, habits, needs and experiences related to travelling (e.g. the need of work during travelling) play a prominent role. These factors are also related to the context of the given trip, including the purpose of journey/trip.

Situation related to a trip, including purposes of travel

Situation related with a given trip has a significant effect on a choice of transport mode. This is particularly important in case of long-distance travel, i.e. these which are relatively rare events, at least in comparison with trips made on a regular, daily basis, and their length amounts to no less than 50-100 km. A certain problem is posed by the fact that the threshold distinguishing long- and short-distance trips can range from 20 km (as in the traffic research studies in Italy up to 200 km (as in similar studies in Belgium) (Zimmeer & Schmied 2008). In transport studies carried out in Great Britain under the *National Traffic Survey* that distance amounts to 50 miles (83 km). A considerable part of passenger kilometers stem from long-distance travel, accounting for a large share of general transport performance (up to between 30 and 50%) (Rohr et al. 2010; Rich & Mabit 2011).

The factors associated with travel include (cf. Rosik & Kowalczyk 2015):

– generalized travel costs (distance, time, cost, as well as the remaining components, such as *inter alia* safety and comfort),
– travel purpose,
– other factors (time of the day, season of the year, size of the luggage, number of people travelling, necessity for the use of car at the journey destination and weather conditions).

Generalized cost of travel. The most important factors determining the choice of mode of transport include two preferences: price and travel time. Starting from the microeconomic theory of utility maximization (attaining the maximum level of utility due to the right choice) and sustainable approach in the form of minimization of "non-utility", the utility function can adopt the form of so-called generalized cost which is composed of important elements such as travel price, time travel and unit value of time travel (Żurkowski 2009).

Travel by car has the advantage in that it enables travelling from door-to-door, which results in significant time savings as compared to public transport. This is particularly important in short-distance trips. The key element of the generalized travel cost is unit cost of travel time and what

is associated with it the value of time travel. The value of time depends on many factors, including the most studied in the literature of the subject ones, as for example: length of travel and mode of transport, purpose of travel, as well as income, age, gender and education of travelers.

In general (for broader discussion see Rosik & Kowalczyk 2015) the travel time values by car and train are close to each other and much lower than the estimation of travel time value by air. As regards private travels, this estimation is two times lower than that of business travel. Businessmen perceive travel time as one of the most important determinants for the choice of transport mode, whereas in case of remaining groups of travellers, other factors (among others such as transport costs) predominantly influence their decisions concerning the choice of transport services.

Generally speaking, with the observed continuous increase of the total annual travel mileage, the role of private cars decreases. Based on the research studies carried out in Great Britain, it was revealed that in the years 2002-2006 the share of trips undertaken by private cars in total transport performance fell from 86% with regard to trips of 50-75 miles to only 44% for trips longer than 350 miles. In addition, there was a steady increase of average car occupancy (number of passengers per car). In case of trips longer than 250 miles, the average car occupancy began to exceed 2 persons (Fig. 4).

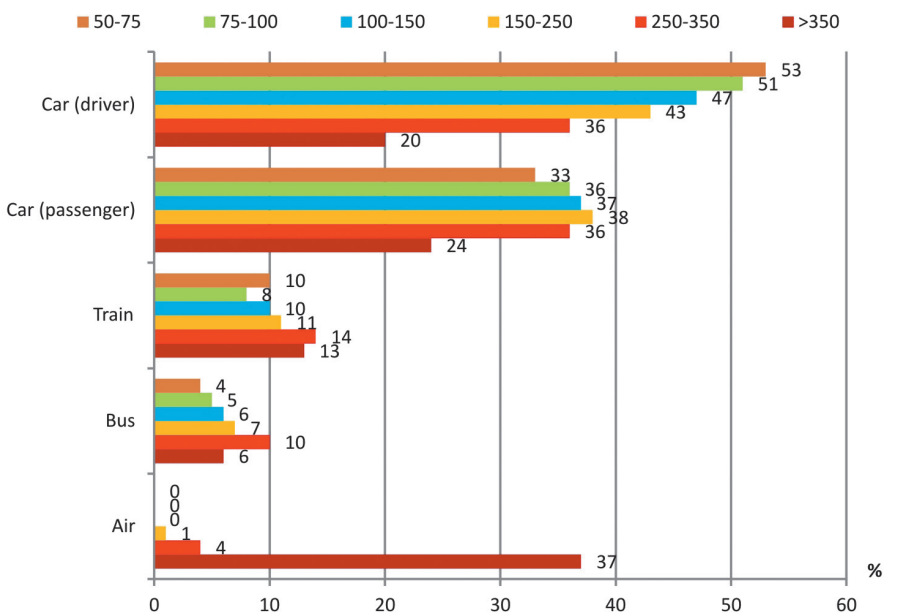

Figure 4. Traffic volume/traffic performance by mode of transport depending on the length of travel in Great Britain (2002-2006)
Source: Rosik & Kowalczyk (2015) after Rohr et al. (2010).

The ratio of fuel costs to fare costs in public transport is a key factor in travel decision-making. In case of travel along the sections of toll motorways, also the toll costs need to be taken into account. The other elements of car travel costs include tolls on cars entering the city centres that are obligatory in some large world cities (i.e. London or Singapore), as well as costs of parking fees (the paid-parking zones in many cities are becoming more and more common). The parking

costs are of much significance especially to agglomeration population. For example, according to research studies that were carried out in Montreal, increase in hourly parking fees by 1$ resulted in 5-percent increase in share of the public transport commuting trips to work in the total trips (Zahabi et al. 2012). In addition, car travel might be associated with lower safety, higher risk of accidents (in particular on a single carriageway road), as well with lower travel comfort (driving requires continuous attention). But the latter element is a matter of subjective opinion, especially in light of the fact that travelling by car enables door-to-door access to locations and also it is, for many car drivers, a source of pleasure (so-called pleasure of driving). The majority of factors related to the generalized cost of travel have, however, a spatial nature, being in addition a matter of subjective attitude. The only exception are paid-parking zones and motorways tolls which lead to lower modal share of car usage for commuting purposes in case of places-of-work in the centres of cities/towns (paid-parking zones) or in the selected sections of inter-agglomeration motorways and access routes to cities (motorway tolls).

Purpose of travel. Structure of long-distance journeys by private car indicates that the most frequent trip purpose is for tourism followed by: visiting relatives and friends, business trips as well long-distance commuting to work. In light of the studies by Dargay and Clark (2012), private car was a principal mode of transport in long-distance trips taken in Great Britain in the years 2002-2006, independently of travel purpose, with private car mode clearly dominating the modal share in the range of 74 to 84% (visits to relatives/friends constituted the highest share of car trips, whereas the lowest share was for commuting to work). As regards commuting to work, the most important factor are the issues related with generalized cost (e.g. fuel costs, parking fees, etc.), as well as with possibilities for doing work during the commute.

As regards analysis of all travels in context of distance covered, the annual average distances travelled by private car driver by particular purposes are of particular importance from the point of view of the aims of the current paper. Unfortunately, in the study conducted in Great Britain, holiday travels and visiting friends and relatives fall into the one group whose share in the overall transport performance in 2010 is the highest (20.5% of average annual mileage of car driver). Subsequent purposes involve: commuting to work (26.1%), shopping (12.9%) and business (12.7%) trips.

In case of specific trip purposes, we can talk about different impact of spatial structure on the motivation for travel. For example, in Great Britain there is a marked difference in distance travelled by purpose (aggregated for all modes of transport) between Greater London and rural areas, which is evident for all purposes, but in particular with regard to shopping, holiday and leisure trips. In turn, there is a surprisingly minor difference in relation to the distance covered for commuting purpose (Fig. 5).

Due to the fact that online shopping is becoming increasingly popular across all-age population groups, there is a decline in number of shopping trips, primarily in the ones to large shopping centres (cf. *Understanding the drivers*… 2015). Multi-purpose trips or also multi-destination trips are a separate issue – under these circumstances private car use is much more convenient than the use of other modes of transport.

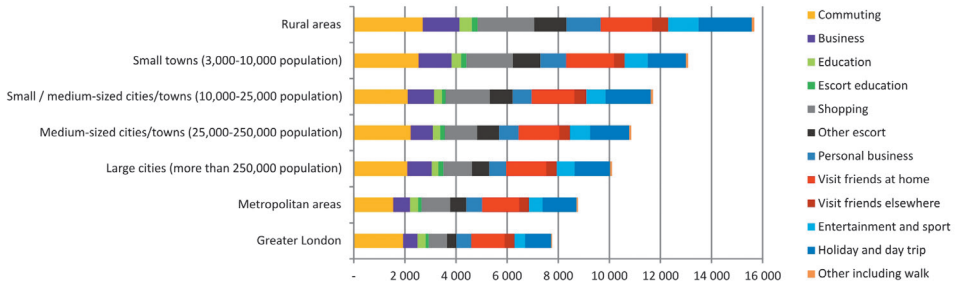

Figure 5. Average annual distance travelled for particular trip purposes by place of residence in Great Britain as of 2010-2011 (in km)

Source: National Travel Survey https://www.gov.uk/government/statistics/national-travel-survey-2014.

Other factors (time of a day/season of the year, size of baggage taken, number of travelers, necessity to use the car in the destination city/town and weather conditions). Under conditions of congestion that occur during the morning and afternoon peak hours (primarily in cities and agglomerations) as well as on individual days of the year owing to heavy road traffic during weekends, seasonal holidays and in tourist season, there is a reduced comfort of travel which may affect the choice of alternative mode of transport. In turn, a greater amount of personal baggage, increase in number of travelers (even up to 4 or 5 persons) and poor weather conditions may result in restricting the modal choice to private car. However, on the other hand, with a further increase in number of persons it is possible to use alternative modes of transport (e.g. train or bus), and, additionally, in the case of extremely unfavorable weather conditions (especially in winter months) there is a higher risk of accidents in combination with a lower comfort of travel.

Conclusions. Generalized travel cost has largely a spatial meaning, it results from travel time and costs of travel by car in relation to the costs of travel by public transport. For obvious reasons, as far as relational and directional aspects are concerned, these differences can be clearly evident. At the level of specific cities/towns and agglomerations, such components of generalized cost as, for example, parking fees are also of key importance. In broad terms, the longer the distance to travel and the higher the non-fuel costs (motorway tolls, parking fees, etc.), the lower tendency to use private car as a transport mode in a given trip. From the the current paper's aims point of view, the particular importance of the structure of separate trip purposes in the total distance travelled by car driver compels one to conclude that (at least in Great Britain) long-distance journeys such as tourist trips, visits to relatives and friends and business travels may account for 50% of the traffic volume, whereas the remaining purposes to a larger degree constitute commuting to work, followed by shopping trips and driving children to school. The structure of trip purposes varies depending on density of settlement network. In rural areas there is a significantly higher share of shopping, leisure and tourist trips than that noted in cities/towns. Decisions concerning the choice of a car as a transport mode are affected also by the other factors such as: season of the year/time of a day, amount of luggage taken, number of travelers necessity to use a car in the destination city/town and, lastly, weather conditions.

Quality of road network and public transport

The most important factors that affect the choice of a car as a mode of transport, also in terms of spatial configuration/from spatial perspective, include:

– quality of road network,
– quality of public transport.

Quality of road network. The quality of road network can be interpreted in a traditional sense as a share of network of higher category of roads (primarily collision-free dual carriageway roads) in the total road network and as a quantity combined with quality of linear- and point-type facilities of the road infrastructure (general density of road network, number of interchanges, parking infrastructure, road surface condition, width of roads, etc.). From a road traffic distribution point of view, it needs to be noted that as the network of motorways expands, there is the higher concentration of traffic volume on the newly developed roads. For example, as regards Great Britain, as compared with 1993, in 2013 the volume of traffic on higher category of roads increased by an outstanding 47%, with simultaneous mere 18% increase of traffic observed in the entire road network and only insignificant growth of traffic volume in the cities/towns (*Understanding the drivers… 2015*). Also the traffic management is of critical importance (Meurs & Haaijer 2001). For instance, powiat (county) or gmina (commune) characterized by well developed network of bike and pedestrian paths are the places where people are more eager to walk and cycle. In turn, in the cities/towns where there are easily accessible parking spaces, people show increased willingness to make use of their cars, but a well developed park&ride system creates favorable conditions for the use of different modes of transport.

Quality of public transport. The quality of public transport is affected by such factors as: quality of fleet, frequency of service, directness of service (possibility of travelling with no transfers), pricing of fares, level of services, safety, comfort of travel, schedule, reliability and elasticity. Also, of key importance, strictly connected to other factors, primarily to the journey circumstances and spatial structure, is proximity/accessibility of origin and destination points to public transport station/stop as well as its character/interconnectivity. The quality of public transport has particular significance in the metropolitan areas, where a well-functioning public transport system results in a reduced car ownership (according to studies in Spain under conditions of well-developed public transport there was a significant 12% decrease in the level of motorization) and car use (Meurs & Haaijer 2001; Matas & Raymond 2008). Further infrastructural investments or further improvement in travel conditions may lead to occurrence of induced traffic phenomena, i.e. serving as incentive for collective transport. Induced traffic concerns journeys which in the original situation (with no investments) were abandoned because of poor conditions of travel (Szarata 2012).

Classification of demand determinants in individual transport

Based on the classification, four groups of demand determinants in individual transport can be identified, includingspatial structure, situation associated with travel, socio-economic and demographic characteristics of household, quality of road network and public transport (Tab. 1).

Table 1. Determinants of demand in individual transport

Spatial structure	Socio-economic and demographic characteristics of a household	Situation associated with travel, including travel purpose	Quality of road network and public transport
1. Density of settlement network. 2. Level of spatial peripherality. 3. Location of traffic production potential with regard to traffic attraction potential.	1. Economic factors: – income, – income elasticity of demand, – cost of car purchase, – fuel costs, – operating costs (maintenance, insurance and car repairs). 2. Demographic factors: – demographic structure (e.g. employed persons, children, etc.), – age, – gender. 3. Sociological factors: – prestige and social status, – life style, – habits, customs, needs and experiences.	1. Generalized cost of travel: – time travel, including value of time travel, – cost of travel, • parking costs, • fuel costs, • motorway tolls, • the remaining fixed costs, – the remaining elements of generalized costs: • security, • comfort, • other. 2. Travel purposes: – short-distance travel: • commuting to work, • shopping trips, • school trips, – long-distance travels: • business trips, • visits to friends and relatives, • tourist trips, – multipurpose trips (multilocation). 3. The remaining factors: – time of day/season of year, – number of travelers, – necessity of car use in destination city/towns, – weather conditions.	1. Quality of road network: – share of road network characterized by higher category of roads (including collision-free dual carriages roads) in the total road network, – number and quality of linear- and point-type road infrastructure facilities, • general road network density, • quantity of interchanges, • quantity of parking spaces, • road surface condition, • road width. 2. Quality of public transport: – quality of fleet, – frequency of services, – directness (possibility of travel with no transfers), – fare pricing, – level of services quality, – safety, – comfort, – schedule, – reliability, – elasticity, – proximity/availability of origin/destination travel points to the nearest station/stop, and its character/interconnectivity.

Source: own elaboration after Rosik & Kowalczyk (2015).

Conclusions

As the density of settlement network grows, there is an increase in congestion and improvement in quality of public transport which leads to decreased degree of car use as well as generally lower level of motorization. This is particularly noticeable in large cities. In turn, there is lack of alternative modes of transport in the peripheral areas, which, in combination with longer-distance journeys to reach destinations, results both in higher level of motorization as well as in relatively greater car mileages. Peripheries can be defined at different spatial levels, which matters in context of distance from places-of-work, understood both in the sense of quantity (number) and of quality (amount of earnings). Household income, as well as income elasticity of demand in context of private car

purchase, strongly affects the level of motorization. In turn, income elasticity of demand with regard to purchase of fuel affects the actual use of car. Apart from the fuel costs, other operating costs are increasingly gaining in importance. The largest annual distances are covered by working population, of which especially the car drivers aged more than 30 are characterized by the largest mileages. Population in the pre-working age group do not possess driving license, whereas the persons in the post-working age group with the passing of time tend to use their cars less frequently. Females drive less than males, but as regards younger generation these differences are hardly noticeable. In highly developed countries, prestige and social status resulting from car ownership is becoming increasingly less significant, while the less car-dependent lifestyle is beginning to play increasingly important role. However, in order for researchers to see whether the 'peak-car' hypothesis is justified, they should wait until the effects of post-crisis wave have faded away. In general, socio-economic and demographic differentiations among the population (primarily concerning gender and age) influence the rate of growth in both motorization and private car use. Spatial differentiations regarding the quality of road network and public transport, as well as traffic management factor, can significantly affect the network users' choice of transportation mode. Improved quality of public transport creates favourable conditions for modal shift and resigning from car use, particularly at the intra- and inter-agglomeration level. In the peripheral areas, these factors seem to play an insignificant role.

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