

Transport costs and their impact on the expansion of cities and agglomerations

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Abstract Costs as a component that represents the decision-making factor for each individual or company, we meet every day. This article focuses on transport costs that have an impact on urban sprawl, reverting to the source of the individual's transportation target and changing the choice of transfer decision-making with respect to transport costs. Habits how to move from one place to another, in greatly affects the means of transport used by the individual. It is this factor, how to positively influence a passenger to replace individual car traffic for another mode of transport by means of transport costs this article will be dealt with. The degree of automotive has a rising character over the year. It is precisely a tool for helping to partially eliminate the negative impact of individual car traffic on society and city expanses are transport costs.

Key words transport cost, expansion of cities, parking

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1. Introduction

The various studies carried out in the world in the field of transport point to reality, that in spreading the radius and the area of the city to wider areas, it is necessary to use a car for transport to these more remote parts of the city, as a relocation tool. A car is just one of the most important factors affecting the shape and appearance of the city [1]. This also entails transport costs for relocation from one part of the city to another part of city. When using a car as a means of transport for convenient transportation to the destination of the chosen destination (such as employment, school, interest activities...), occur suddenly at certain time periods of the day called, intense toes, congestion. They bring you directly and are related to the costs that a car user must incur. As a result of staying in congestions, the driver and potential co-driver loses the time that could be used, for example, for labour productivity. This effect of losing time and costs associated with it is also called externality [2].

The study conducted in the US in 2003 estimates that by adding the value of the time lost to the amount of unnecessary fuel consumed due to delays and slow operation have been counted in the annual surplus of traffic congestion worth \$ 63 billion [3]. It is also proven by this study, that unrequited types of roads cause an undue burden on roads and thus the spread of cities and agglomerations [4]. Little attention has been paid to the various studies of

transport costs such as vehicle insurance, car maintenance charges and parking fees as factors that act on urban growth. In this article we will focus on one of the cost factors, namely the price for parking.

2. Price for parking

In general, for years, it was self-evident to park with a vehicle in the center of the city even without charge [5]. At this time, there has been a change in this area with the rising pace of automotive levels and there are already many restrictions on vehicle parking in city centers (for example in some cities there are emission zones, more expensive parking fees, fewer stables, and so on). The following tables show the development of a change in the growth of passenger cars respectively a change in the growth of the automotive grade in the EU Member States during 2013 – Table 1 and year 2014 – Table 2. Also, the chart shows a statistical overview of the level of automobile in years 2013 and 2014 in EU member countries. In Table 3 and the following chart shows an increase in the change of automobile in the year-on-year comparison 2013 and 2014 (Eurostat – annual report of the year 2017) [6].

Table 1. Automotive degree in the EU Member States for 2013

Country	Number of cars per 1000 inhabitants	State	Number of cars per 1000 inhabitants
BE	491	LT	615
BG	402	LU	661
CZ	450	HU	308
DK	405	MT	602
DE	543	NL	471
EE	478	AT	546
IE	420	PL	504
EL	466	PT	430
ES	474	RO	235
FR	504	SI	516
HR	341	SK	347
IT	608	FI	574
CY	553	SE	466
LV	317	UK	468

Source: processed by the authors from Eurostat statistics 2017

Table 2. Automotive degree in the EU Member States for 2014

Country	Number of cars per 1000 inhabitants	State	Number of cars per 1000 inhabitants
BE	491	LT	620
BG	405	LU	752
CZ	468	HU	308
DK	439	MT	602
DE	581	NL	494
EE	494	AT	546
IE	441	PL	513
EL	472	PT	444
ES	492	RO	239
FR	531	SI	542
HR	349	SK	360
IT	630	FI	593
CY	563	SE	498
LV	323	UK	507

Source: processed by the authors from Eurostat statistics 2017

In Table 3 we can observe an increase in the change of automobile in the year-on-year comparison 2013 and 2014 according to statistical data provided by Eurostat. In most Member States of EU, an increased number of passenger cars can be observed within one year [7]. Slovakia is the country average in statistics with a year-on-year increase in the number of passenger cars per 1000 inhabitants with a year-on-year increase in the number of 13 passenger cars per 1000 inhabitants [8].

Table 3. Year-on-year increase in automotive grade in EU member countries in 2013 and 2014

Country	Number of cars per 1000 inhabitants	State	Number of cars per 1000 inhabitants
BE	-	LT	5
BG	3	LU	91
CZ	18	HU	-
DK	34	MT	-
DE	38	NL	23
EE	16	AT	-
IE	21	PL	9
EL	6	PT	14
ES	18	RO	4
FR	27	SI	26
HR	8	SK	13
IT	22	FI	19
CY	10	SE	32
LV	6	UK	39

Source: processed by the authors from Eurostat statistics 2017

It's just free parking that motorists have been used to in the past, significantly influenced the decision to travel an individual by an individual car transport and discouraged them from all other forms of commuting such as the use of public passenger transport, or the use of bicycles, if necessary on foot [9]. Automobile is generally defined as the level of occupation of the population by private cars [10]. It is expressed in two ways. The first is the ratio of the number of inhabitants per passenger car (Fig. 1) or the automobile is expressed as the number of passenger cars per 1000 inhabitants (Fig 2) [11]. In both cases of expressing the automobile, the annual trend increase in the number of cars is obvious of the population of the SR. The current development of automotive in Slovakia can be defined as gradually developing dynamically, where the number of passenger cars increased 3.4 times compared to 1970 to 1980, between 1980 and 1990 it was 1.6 times, between 1990 and 2000 it was 1.5 times and in the years 2000-2010 by 1.3 times. This trend in the number of passenger cars in Slovakia suggests, that we are approaching the EU average, where in 2013 passenger car equipment in 28 member countries was worthwhile 471 cars per 1000 inhabitants. This development over the years has an unfortunate impact on the number of vehicles on the road, with related congestion [12]. The higher the number of cars, the higher the economic performance of the society, but as a result it has negative impacts on transport and the associated increased transport costs.

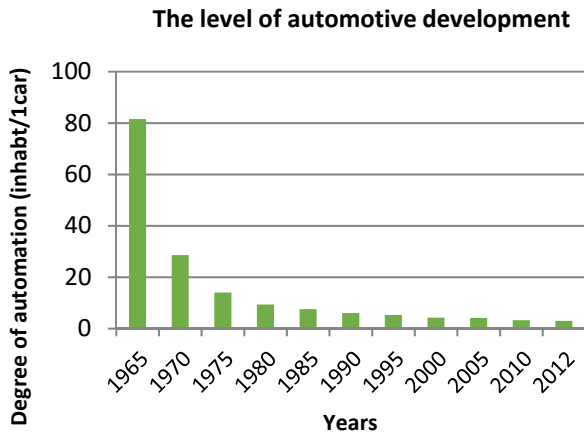


Figure 1. The trend of the development of the automobile degree in Slovakia, which shows the ratio of the number of Slovak citizens living on one passenger car; Source: processed by author according to ŠÚSR

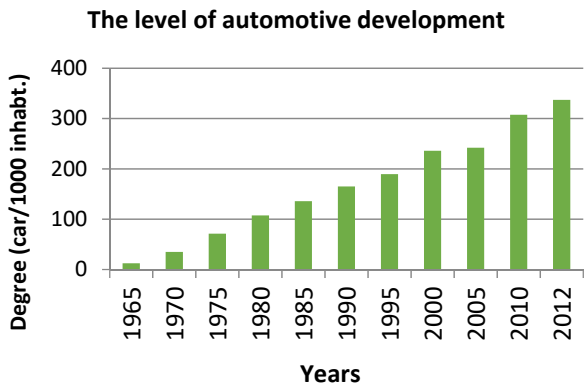


Figure 2. The trend of automotive development in Slovakia, which shows the number of passenger cars per 1000 inhabitants

Charging parking and deciding how much parking will be, has in competition of city leadership in the city centers. As this is a political decision, payment factor for parking, it is one of the unpopular steps to increase the cost of parking. However, it is necessary to proceed to this step, with regard to the annual growth of cars in the world. The degree of automobile, determined by the number of passenger cars per 1000 inhabitants compared to 28 countries EU, Japan, China and Russia for 2015 is shown in Figure 3.

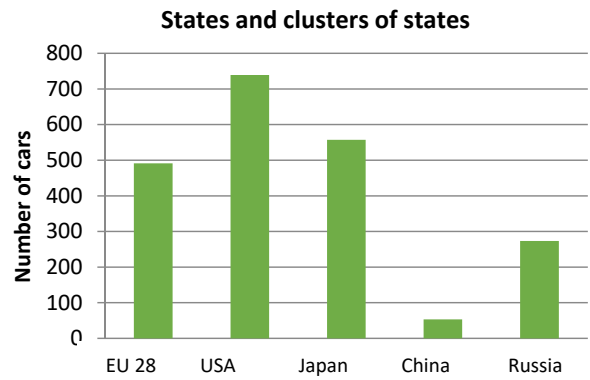


Figure 3. The degree of automobile, determined by the number of passenger cars per 1000 inhabitants, is compared between 28 states EU, Japan, China and Russia for year 2013; Source: processed by the authors from Eurostat statistics 2017

Obviously, when deciding the population on housing in the long run residents of the city do not consider when deciding which part of the city to choose for their residence with regard to commuting and moving to the destination selected, in terms of parking costs and their impact on these factors. But this claim is no longer valid for newly immigrated populations who are already considering what impact the rising costs of living would have, the further away from the city center. Just the cost item of the parking rate shows a change in the behaviour of immigrant behaviour in the city in terms of transport. Many studies have shown, that car drivers are aware that they will have to accept and accept additional increases in transport costs with increased parking prices [13]. This type of population, newcomers can reassess their choice of housing in suburban areas of the city and potentially decide to approach the city center, so that they can use the benefits of urban public transport system more effectively. This would reduce the need to travel to the city center by individual car transport and ultimately reduces transport costs at the cost of parking. The rise in cities also results in an increase in the level of automotive worldwide. It results from the fact that the population owning a passenger car is willing to be transported to its target location even assuming, that it will be a longer distance from the source of the starting point. This has a negative financial impact, because it accepts all transport costs, which this relocation brings with it. Long distance transport generally means increased costs for the passenger, in the form of loss of time and finances.

Single European Transport Area Plan, due to the competitiveness of the transport system efficient resource, in the so-called " The White Book is the mentioned aspect of the future development of passenger transport by 2050 [14]. It is mentioned in this document that without effective action how different costs are passed on to car users, the automobile will only grow. Passenger transport by 2030 should be increased by 34% and by 51% by 2050 [15]. Thanks to this future development, urban sprawl can also be

expected. Transport costs and many other limitations should contribute to a reduced rate of such forecasts. It is up to the decision of the cities and authorities that have their own parking space, how they will face the cost of passing on the cost to vehicle users, whether they will be charged to a greater extent, or the cities themselves will negatively affect the expansion of cities.

3. Conclusion

By pointing to the current state of individual car transport, due to the spread of places can be noticed, that without balanced, effective decisions they should make the transfer of user costs will not occur. The transport costs are one of the effective tools to eliminate negative impacts of cars in city centers. Reduce the need for the use of passenger cars to a minimum or in inevitable situations for commuting people within cities and to replace the mode of transport by public transport would be an optimal scenario. It is the cost of motorists to drive them off, why in the growing cities to use the car to move. The transport costs as a parking and economic aspect will be an instrument as from city centers to reduce the number of vehicles and associated with agglomeration expansion.

REFERENCES

- [1] J.K. Brueckner, D.A. Fransler, "The Economics of urban sprawl" in *The Review of Economics and Statistic*, 1983, pp. 479-482.
- [2] P. Newman, J. Kenworthy, "Overcoming automobile dependence" in *Sustainability and cities*, 1999, Washington D.C., USA, 1999, pp. 442.
- [3] A. Anas, H. -J. Rhee, "Curbing excess sprawl with congestion tolls and urban boundaries" in *Regional Science and Urban Economics*, 2006, pp. 510-541
- [4] A. O'Sullivan, "Urban economics" ed. New York 6th., 2007, New York, USA, pp. 78.
- [5] D. Shoup, "The high cost of free parking", in *Planners Press*, 2011, Chicago, USA, 2011, pp. 451- 460.
- [6] P. Drozdziel, S. Piasecki, "Study of the method of assessing the economic efficiency of exploitation cars in a transport company" in *Folia Societatis Scientiarum Lublinensis*, 1995, Lublin, Poland, 1995, pp. 60-66.
- [7] A.A. Walters, "The economics of road user charges" in *World Bank Staff occasional paper*, 1968, Baltimore, USA, 1968, John Hopkins Press.
- [8] D.M. Newbery, "Road damage externalities and road user charges", 1988, *Econometrica*, pp. 42-48.
- [9] H. Frumkin, L. Frank, R. Jackson, "Urban sprawl and public health" in *Island Press*, 2004, Washington D.C., USA, 2004.
- [10] D. Ayala, O. Wolfson, B. Xu, B. Dasgupta, J. Lin, "Pricing of parking for congestion reduction", in *Proceedings of Sigspatial/GIS*, 2010, pp. 43- 51.
- [11] Z. Říha, J. Tichý, "The Costs Calculation And Modelling In Transport" in *Transport Means 2015*, Kaunas, Lithuania, 2015, pp. 388-391 pp.
- [12] M. Poliak, A. Poliaková, "Relation of social legislation in road transport on driver's work quality" in *Tools of transport telematics, TsT 2015*, Wroclaw, Poland, 2015, pp. 300-310.
- [13] J. Gnap, J. Cajchan, M. Šulgan, "Measuring methodology form real bus-stop distances of public passenger transport" *Jan. 2003*.
- [14] Z. Říha, J. Tichý, "The Measure for Costs Indexation in Road Freight Transport" in *OSTAŠEVIČIUS, V., ed. Proceedings of 20th International Conference Transport Means 2016*, Kaunas, Lithuania, 2016, pp. 778-783.
- [15] R. Jurecki, M. Poliak, M. Jaskiewicz, "Young adult drivers: simulated behaviour in a car-following situation" in *Promet - Traffic& Transportation : scientific journal on traffic and transportation research*, 2017, Zagreb, Croatia, 2017, pp. 381-390.