CORVINUS UNIVERSITY of BUDAPEST

Ph.D. Programme
in Management and
Business Administration

THESES OF PH.D. DISSERTATION

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Personal City Mobility in the Context of Sustainable Development

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Budapest, 2017

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1. Background and aims of the research

As mankind evolves, it conquers every space it can reach. The expansion of the habitual "presence range" of an average contemporary human being is influenced by his/her increased ability to travel, and to do it fast - between his/her living area, schools, shops, working places, administrative centers and the scenes of social and recreational activity. In the modern cities of today the main personal means of transportation are the road vehicles. In too many countries people have become not only addicted to travel, but also addicted to owing more than one vehicle in the household - in some countries preferably one per each adult family member, and in such a way that it has led to extremely heavy traffic, congestion, pollution, accidents, increased fuel consumption and material waste. We are witnessing excessive depletion of energy resources and - overwhelmingly often - selfish attitude to personal mobility on all levels, from personal to governmental. Something shall be done to slow down this process of devouring energy resources and nature demolition. Our cities are overburdened with passenger cars, whose huge numbers continue to grow. They overtake our space, pollute our air and limit our walking areas. If we do not change our approach to personal mobility in the cities, the situation will only get worse - meaning that it is not sustainable in its present form.

This is **the main point of my dissertation** - how can we improve the quality of city life and ensure modern mobility for ourselves and for our future generations?

The concept of sustainable development has been constantly scrutinized by the academic and political community for the last decades. Thanks to the foresight and still continuing perseverance of its pioneers the modern origins and complexity of sustainable development became part of the Hungarian university curriculum at the end of the last century - e.g. see (Kerekes, A környezetgazdaságtan alapjai, 1998).

In 2005 Tamás Fleischer pointed out that the most frequently cited definition of sustainable development was originating from the Bruntland report (Report of the World Commission on Environment and Development: Our Common Future, 1987), which taken out of context might cause misinterpretation, because it was generally discussing the time dimension of sustainability (Fleischer, 2005) (p. 2). Same year Christopher Zegras, while trying to derive an operational definition for the measuring of sustainable urban mobility, presented a deep analysis of the origins of sustainability concept itself, which led him to the early eighteenth century, when German Hans von Carlowitz published his book on forestry practice in 1713. (Zegras, 2005) (p. 24).

In this regard we can even go back to the ancient hunting laws, which were wisely limiting hunting and presumably trying to preserve the game for the next season (next year, next generation) as well - see "The Laws of Ancient Crete c.650-400 BCE" (Gagarin & Perlman, 2016) (p. 213).

Some say that there really is no clear definition and that, "Sustainable development is increasingly being presented as a pathway to all that is good and desirable in society" (Holden, Linnerud, & Banister, 2014) (p. 130).

In terms of sustainable mobility - related to the personal transport - the definitions are equally too many and every year we can have new ones. For those, who would like to investigate the theoretical side of the concept I can recommend the above mentioned work by Zegras, who himself says that the phrase 'sustainable transport system' has become synonymous with "good transport" (Zegras, 2005) (p. 26) and that the main threats to sustainability in transportation "are those that impact our immediate existence, such as accidents that kill or maim us, pollution that can make us acutely ill (or make it acutely difficult to sleep or rest), or loss of time..." (Zegras, 2005) (p. 28).

After all, the basic idea is simple - we need to shape our city mobility in such a way that the ease and safety of our everyday movements now and in the future will not diminish, but grow and the quality of life will not suffer, but improve for us and for the generations to come.

This dissertation is investigating the following topics:

What is the current situation with the personal mobility in the cities?

What are the reasons for the current situation?

Can we reach sustainable mobility by replacing the traditional internal combustion engines in modern passenger vehicles with less polluting or even zero emission propulsion technology?

Is it possible to live in cities without private passenger vehicles, only with public transport?

What shall be the desirable future model of sustainable city mobility?

What is the role of the market lobby and that of the policy makers?

Hypotheses:

1. The majority of the passenger car buyers in their choice of personal cars are motivated by convenience, social status, cost efficiency and not by environmentally friendly attitude.
2. Similarly, when choosing the means of travel in the city, citizens are mostly motivated by convenience.
3. However strong the environmental commitment of the citizens is, in itself it will never be enough in terms of personal city mobility, because their desire for safety and comfort is stronger.
4. Consequently, the sustainable mobility modes based on minimal private car use cannot be expected to spread spontaneously without the strong limitation of the current conventional mobility based on private car use.
5. Personal driving can be reduced only if the city simultaneously restricts driving and offers real-life alternative mobility modes that are fast, cheap, comfortable and more appealing - healthy lifestyle and fun.

2. Data gathered, review of the sustainable mobility literature and methodology

2.1. Regulation, city's heritage and technological development - the main driving forces in shaping city mobility

The mass production of the automobiles, as shown in point 2.1.6.[1], has made private passenger cars so affordable, that the number of passenger cars continuously increases.

The evolution of the automobile, finely influenced by the subtle power of the oil lobby (see point 2.1.3.), together with the stable growth of living standards (point 3.1.3.) lead to our present addiction to vehicles using fossil fuels. Although the growth of car ownership in the developed countries is slowing down, that is mostly the result of saturation, not of new thinking (3.1.2.). As a whole the wealthier countries continue to increase their already massive car fleets. But the historically set trend of western type personal mobility has also given a bad example for the less developed countries as well (3.1.4.). The citizens in the newer members of the EU are fascinated with cars, which is leading them in the wrong direction, since they already start to overtake the richer states in terms of motorisation - like Lithuania, having more cars per 1,000 inhabitants than Austria, Germany and Switzerland. The hunger for owing a car as a level of self esteem is distorting general attitude to mobility, well expressed by the result of my Maltese research, where for a person after turning 18 years old gaining personal independence has come to be symbolized by acquiring one's own car. That leads to overmotorisation, congestion, useless loss of time, environmental deterioration and reduced quality of life. Which, according to empirical data, most local people are clearly aware of.

Among the various types of propulsion (e.g. Internal Combustion Engines, Electric Engines and their combinations, generally called Hybrid) the most common are the internal combustion engines; among the different types of fuel gasoline and diesel are dominating (see 2.2.). Although many countries are boldly and conscientiously supporting the development of alternative solutions, the renewable automotive fuels still have a long way to go. They are currently generally considered only to contribute to sustainability, but not to solve the issue in the foreseeable future. For example, in case of hydrogen, most of it is still produced from fossil resources such as natural gas, oil and coal. Introduction of zero emission cars is on the agenda of all progressive governments, some of which (see 2.2.4.) already announce future plans to ban petrol and diesel cars, but many countries will not be that drastic for years to come and until then will try to improve the efficiency of the traditionally used engines and try to save fossil fuel.

[1] Refering to the dissertation - here and later

National emission standards in the EU and in other economic areas already stimulate car manufacturers to constantly reduce emissions, and taxation in most cases is motivating the buyers to choose less polluting vehicles (see 2.1.5.). The fuel consumption and the harmful emissions of the modern vehicles have been steadily decreasing. Manufacturers heavily invest in the development of systems for alternative fuels like CNG, LNG, bio-ethanol, bio-diesel, hydrogen and electricity. Hybrid vehicles are gaining market share, with Plug-in Hybrids already considered mature technology, preparing us for the age of silent vehicles with purely electric engines. But all of the above-listed development is just an old-fashioned approach, reducing the waste, which we constantly produce, decreasing the damage, smoothing out the sharp edges. The research shows, that the traditional solutions strive to improve the existing infrastructure and decrease congestion, meaning building more, better, safer roads for our passenger cars, increasing the number of lanes in motorways and main urban roads, computerizing traffic lights to avoid loss of time at crossroads, building roundabouts and smart junctions to avoid traffic lights, striving to decrease the consumption of our engines, to make them emit less pollutants into our cities, and so on. All these approaches are focused on improving efficiency, but try to keep our old travel patterns unchanged. If we continue in the same way, we will keep setting wrong goals like minimum laboratory fuel consumption of the vehicles, and will keep achieving totally unpredictable real life results, as in the case of the revealed cheating software installed by Volkswagen and other carmakers in point 2.1.5. Without changing our approach to the situation we will keep chasing false horizons.

By replacing the traditional internal combustion engines in passenger vehicles with less polluting or even zero emission propulsion technology we will definitely not reach sustainable result, because the vehicles themselves will still remain on the roads in ever growing excessive numbers. We will still experience the same useless waste of time when sitting stuck in traffic jams. We will have additional millions of vehicles, mainly resting in the parking lots - not only an incomprehensible waste of material resources, but stealing our space as well. It is time to reach for the next level of environmental care - to rethink our behaviour and avoid creating the damage in the first place.

The only possible approach to urban mobility is not only to improve the vehicles, but to improve the different attitudes to city travel, where citizens suffer from traffic congestions.

The most important role in the struggle to achieve sustainable mobility is nowadays played not by the car manufacturers, but by the innovative municipalities, who support new mobility trends. They endorse psychological change and promote healthy mobility as

an organic part of healthy life style. Growing GDP per capita shows correlation with increasing car ownership (see the analysis of different markets in point 3.1.1., 3.1.2. and 3.1.3.). This brings a peculiar parallel with the phenomenon of food consumption, increasing proportionally to growing wealth and well-being. Both types of consumption - eating and driving - can go to excess, as shown in point 2.1.5. and 3.1.2. Excess eating leads to obesity, physical and mental deterioration. Excess driving leads to pollution, material waste and ruined quality of city life. Besides, constant driving door-to-door steals our opportunity for naturally required daily physical exercise, and can likewise lead to decline in health. In terms of motoring most people shall be educated to the importance of personal self-restriction, analogously to the above described attitude to food.

Is it possible to live in cities without private passenger vehicles, only with public transport? Definitely yes! On the example of Hong Kong and other densely populated cities with good public transport we can clearly see the birth of a new attitude among people from different age groups and different levels of income, who are happy to lead a carless life in the city (see 3.3.5.). Some of them have never even had a car, they like the fast and efficient public transport, they enjoy walking and cycling. We shall be able to popularize this way of life even in smaller cities than Hong Kong. To complement the fixed network of the public transport, taxi (and its mutant siblings like Shared Taxi and the Taxi-Bus - see 3.3.4.) shall progressively be incorporated into it. The expensive taxi makes personal driving economically preferable. But it will not be right nor fair to make personal driving killingly expensive without providing a decent alternative beside traditional public transport. To make taxi more affordable we shall redesign the taxi business (see 3.3.2.). The success of ride-sharing mobile applications like Uber, attracting users, who prefer this mode of personal mobility to driving, points at high elasticity of customer demand for taxi. This is important, as it means that an affordable taxi fare, prudently chosen after a proper business case study, and then fine-tuned on a regular basis, when necessary, will make many citizens, who presently insist on using their own cars, to abandon their vehicles and choose the convenience of the taxi.

We have many examples of cities whose life style is not dependent on private driving. Some of them are evolving naturally out of necessity - like the case of Hong Kong, where there is simply no other alternative, but to use public transport, and where the municipality is working hard to maintain the efficiency of the public mobility options (see point 3.3.1. and 3.3.5.). There are other, extremely inspiring examples, like that of the small European cities of Graz (Austria) and Freiburg (Germany), which have achieved very high rates of

green mode usage simply because they are planned around these non-auto modes (point 3.3.1.). This attitude is exactly what we need to achieve. In contrast, almost all US cities of similar population size are predestined to be totally automobile dependent, because of practically non-existing public transport and too long distances for walking and cycling to be realistic.

The comparison study between Stockholm and Copenhagen is another proof that attitude matters, and that the high bicycle share of Copenhagen within the mobility modes owes its standing to the much better bicycle infrastructure, consistent funding and persistent coordinated efforts (point 3.3.5.).

Tighter pro-environmental standards and efficiency targets pushing technology developers into the right direction are extremely important, but if we want to achieve sustainable personal mobility, it is not the vehicles, but rather the humans that have to be improved.

2.2. The influence of citizens upon city mobility

To examine the attitude of Budapest citizens towards the environmentally sound city mobility modes and prove the hypotheses stated in the introduction to my dissertation I used the Q Methodology. Although there would be other possible techniques to investigate the topic, after careful deliberation I intentionally chose this approach to move away from the usual scheme and to differentiate my environmentally oriented probe from the traditional statistical data research used in sociology and based on questionnaires and large numbers of respondents to ensure right sampling. Similar stance has been voiced in the past by other colleagues. Ágnes Zsóka Nemcsicsné advocated Q methodology in the research of environmental awareness (Zsóka Nemcsicsné, 2005) citing Ágnes Hofmeister-Tóth (Hofmeister-Tóth, 2005), and Szilvia Luda pointed to the advantages of this method in comparison with all "questionnaire methods" that "think in socio-demographic categories, generate statistics based on age or occupation groups, gender and school qualifications." (Luda, 2012) Furthermore, due to the requirements of the relevant statistical methodology its application necessitates solid financial resources, as opposed to the easily affordable Q Methodology for which free software is available. With properly formulated statements the Q methodology gives the opportunity to outline and subsequently to inspect the basic types of attitudes.

3. Defining the attitude groups by Q methodology. The result of my empirical research

3.1. Application of the Q methodology and selecting the responding group of citizens

For my actual research I used the guidelines of the PQMethod, which has been adapted, revised and maintained by Peter Schmolck on his website http://schmolck.userweb.mwn.de/qmethod/ (Schmolck, 2014).

As a first step I held a series of verbal interviews with different individuals, who were all - with one exception - living in Budapest. The aim was to select city goers that would reflect different life styles, so even if anyone of them should be replaced by another citizen, the overall attitude would not be changed significantly.

Based on preliminary conversations with the potential participants I consistently drafted 81 statements related to the city and centered on the perspectives, opinions and interests of the contributors. The role of the statements was first to generate a reaction from the respondents that would be typical to certain attitudes, then to align the respondents into groups of similar mindsets, attitudes. Some of the statements were formulated from global perspective, others were directly city oriented. Some of the presumably acceptable statements turned out to be contradictory or too challenging and their wording had to be changed. Other statements had to be dropped out in the selection process to ensure a smooth procedure for the respondents.

After thorough checking, selection and fine-tuning involving my tutor, other experts in the field as well as friends living in Budapest, I ultimately reduced the number of statements to 39 (the Q-set).

The respondents had to place all their choices in the provided frame representing the discrete normal distribution, thus sorting the statements according to their individual ranking. These rankings were later entered into the PQMethod software, which compared the rankings to each other, calculated their correlations and produced the results in series of inter-correlation matrixes, from which typical Q-sorts or factors were revealed, exposing common individual opinions within different groups of respondents.

After two preliminary runs of the software and the omitting of two outliers from the examination, the remaining 18 respondents showed clearly distinct groups appropriate for further analysis. In comparison to the first run of the software with 20 respondents, the final structure of the data output visibly improved. Interestingly, the last run with 18 respondents strengthened the factors and even resulted in their reorganization.

In Table 1 the four different factors from the last run of the PQMethod software are shown. Based on the Distinguishing Statements for these factors I named the groups of the respondents as follows: "Speeding Drivers", "Environmentally Conscious", "Comfort Lovers", "Rich and Prudent".

Table 1. Factor Matrix with an X Indicating a Defining Sort (third run of the software with 18 respondents)

		Loadings			
QSORT		1	2	3	4
1	MinFoAff	0.1974	-0.0514	0.3970	0.7136X
2	GenMan	0.5864X	-0.0093	0.0605	0.2343
3	Economis	-0.0767	0.7503X	0.3503	0.0734
4	CityBoy	0.5149X	0.1359	0.4196	-0.1706
5	CorpFin	0.5252X	0.0610	0.3468	0.1069
6	Designer	-0.1237	0.6679X	0.0364	0.4814
7	Banker	0.0903	0.2382	0.0127	0.7302X
8	FinProf	0.4183	0.4489	-0.2076	0.4268
9	UniDocen	0.2416	0.7018X	0.2947	-0.0180
10	Dezs	0.2824	0.8386X	0.0027	0.0504
11	Olvaso	0.4799	-0.3512	0.2701	0.4011
12	LadyProf	-0.1399	0.2797	0.6289X	0.3039
13	MathTeach	-0.0878	0.0583	0.6137X	0.1621
14	Gellerth	0.7480X	0.1037	-0.1513	-0.0743
15	CEO	0.6236X	0.1458	0.1211	0.3113
16	GyogyszV	0.7985X	-0.0366	-0.1177	-0.1100
17	KHTvez	0.5381X	0.2696	0.0030	0.2376
18	CityGirl	0.2106	0.1106	0.7647X	-0.0859
% expl.Var.		19	16	12	11

3.2. Identification of the attitude of the citizens

3.2.1. Preferences of the "Speeding Drivers" group

Table 2 shows the distinguishing statements for Factor 1 ("Speeding Drivers") as compared to the other factors.

Table 2. Distinguishing Statements for Factor 1 ("Speeding Drivers")

(P < .05 ; Asterisk (*) Indicates Significance at P < .01)
Both the Factor Q-Sort Value (Q-SV) and the Z-Score (Z-SCR) are Shown.

Factors			1		2		3		4	
No.	Statement	No.	Q-SV	Z-SCR	Q-SV	Z-SCR	Q-SV	Z-SCR	Q-SV	Z-SCR
9	Much more people would use public transport, if there were m	9	4	2.07*	0	0.35	0	-0.15	2	0.79
31	If the taxi was cheaper, more people would leave their cars	31	3	1.10*	-1	-0.49	-1	-0.41	-4	-1.79
34	All electric cars shall be allowed to use the bus lane free	34	2	0.73*	0	-0.26	-1	-0.42	-2	-0.53
18	For modern successful urban people the comfort and perme és	18	1	0.40	3	1.17	4	1.83	4	1.51
33	The use of the bus lane should be allowed for private cars f	33	1	0.32*	-3	-1.46	-4	-1.83	-3	-1.25
27	Utilizing the bus lane would be more effective, if you could	27	0	-0.04	-2	-0.83	-2	-0.89	-3	-1.30
30	The car is not something that a person lends.	30	-1	-0.57	-3	-1.32	0	0.14	1	0.49
7	Street parking fees in Budapest are unrealistically high, bu	7	-3	-1.21	-1	-0.44	3	1.56	0	0.06
10	Car-free days should be organized, because if you cannot use	10	-3	-1.25*	2	0.99	-1	-0.26	0	0.25
20	All cars should be equipped with a GPS-based speedometer and	20	-4	-1.41*	3	1.30	3	0.84	1	0.28

The respondents in Factor 1 strongly oppose the car-free days and dislike the street parking fees. They love speed so much, that the suggestion of Statement 20 to automatically penalize all cases of speeding is unacceptable to them.

Interestingly enough, while strongly opposing Statement 20 this group shows strong agreement with Statement 28 *(Speed limitation is important and can save lives)* - see Table 3.

Table 3. Factor Scores For Factor 1 ("Speeding Drivers")

No.	Statement	No.	Z-SCORES
9	Much more people would use public transport, if there were m	9	2.074
15	If there were more P+R parking lots (Park and Ride), it woul	15	1.710
28	Speed limitation is important and can save lives.	28	1.455
19	State subsidies and discounts clearly increase demand növeli	19	1.451
23	The longer the time you spend in the city center, the more i	23	1.402
14	People prefer to ride their own cars, because the taxi is mo	14	1.129
31	If the taxi was cheaper, more people would leave their cars	31	1.103
8	If someone wants to drink alcohol during the night, even the	8	1.063
34	All electric cars shall be allowed to use the bus lane free	34	0.728
4	If the local government would only allow electric cars in th	4	0.676
2	State sponsored environmental advertizing and awareness camp	2	0.630
35	Old, less modern vehicles shall be punished by a higher tax.	35	0.564
17	Car buyers will still choose the peak performance, even if t	17	0.556
13	In China, India and other countries with rapidly growing pop	13	0.425
18	For modern successful urban people the comfort and perme és	18	0.397
33	The use of the bus lane should be allowed for private cars f	33	0.324
5	Traffic jams can be eliminated by introducing an appropriate	5	0.164
1	A fejlett országoknak támogatniuk kell a tömegközlekedést Kí	1	0.161
36	Public opinion underestimates the number of environmentally	36	0.119
27	Utilizing the bus lane would be more effective, if you could	27	-0.044
39	By public transport you can comfortably get almost anywhere	39	-0.092
16	Most of the customers of electric cars choose them not becaus	16	-0.153
12	People do not even think about how much it costs to maintain	12	-0.226
26	Business cars with free usage are a bad example and cause ov	26	-0.303
24	Those with higher incomes have the duty to drive the least p	24	-0.323
30	The car is not something that a person lends.	30	-0.573
37	The impact of the transport habits of an individual on the e	37	-0.585
22	All adult family members should maintain their own cars to e	22	-0.615
32	Those who do not enter the city do not care what the air the	32	-0.759
6	We must accept that traditional cars shall be excluded from	6	-0.824
3	Public transport is inferior to using your own car, even if	3	-0.949
29	For a family of 3-5 members 1 car is enough.	29	-0.983
38	The bigger and more expensive the car is, the greater the re	38	-1.105
7	Street parking fees in Budapest are unrealistically high, bu	7	-1.208
10	Car-free days should be organized, because if you cannot use	10	-1.247
11	The urban traffic jam is no problem in terms of time, becaus	11	-1.322
25	Those who can afford the most modern car shall buy it out o	25	-1.380
20	All cars should be equipped with a GPS-based speedometer and	20	-1.406
21	Everyone in Budapest should be obliged to buy a public trans	21	-2.032

Actually all groups share the same opinion in relation to Statement 28 - see Table 4.

Still, "Speeding Drivers" are the only ones to disagree, moreover, strongly to disagree (Z-Score of -1.406) with the idea to punish every incident of breaking the speed limit. Most probable - and quite easy - explanation for this seemingly apparent contradiction is that they consider themselves to be good drivers, who shall be left to drive faster than the speed limit, while all others shall reduce their driving speed to make traffic safer. If GPS

based speeding tickets shall be introduced, then all drivers shall keep speed limits, including our respondents - and that is intolerable for them.

Table 4. Consensus Statements

Consensus Statements -- Those That Do Not Distinguish Between ANY Pair of Factors.
All Listed Statements are Non-Significant at P>.01, and Those Flagged With an * are also Non-Significant at P>.05.

			Factors							
			1		2		3		4	
No.	Statement	No.	Q-SV	Z-SCR	Q-SV	Z-SCR	Q-SV	Z-SCR	Q-SV	Z-SCR
1	The developed countries should support the public transport	1	0	0.16	0	0.34	3	0.94	2	0.98
11*	The urban traffic jam is no problem in terms of time, becaus	11	-3	-1.32	-3	-1.16	-3	-1.53	-4	-1.53
16	Most of the customers of electric cars choose them not becau	16	0	-0.15	2	0.53	1	0.30	0	-0.26
22	All adult family members should maintain their own cars to e	22	-1	-0.61	-3	-1.24	-3	-1.03	-1	-0.49
28	Speed limitation is important and can save lives.	28	4	1.46	4	1.45	2	0.76	4	1.53

Back to Distinguishing Statements 9 and 31, with which Factor 1 agrees most, based on my interviews with the respondents, it seems that "Speeding Drivers" rather hope that after P+R sites are built and taxi becomes cheaper, "others" will reduce their driving and make it easier to drive in the city. This is supported by their Z-Score (1.710) for Statement 15 *(If there were more P+R parking lots /Park and Ride/, it would be easier to drive in the city)*, making it the second in rank for Factor 1 - see Table 3 above.

3.2.2. Preferences of the "Environmentally Conscious" group

Table 5 shows the distinguishing statements for Factor 2 ("Environmentally Conscious") as compared to the other factors.

Table 5. Distinguishing Statements for Factor 2 ("Environmentally Conscious")

(P < .05 ; Asterisk (*) Indicates Significance at P < .01)
Both the Factor Q-Sort Value (Q-SV) and the Z-Score (Z-SCR) are Shown.

			Factors							
			1		2		3		4	
No.	Statement	No.	Q-SV	Z-SCR	Q-SV	Z-SCR	Q-SV	Z-SCR	Q-SV	Z-SCR
26	Business cars with free usage are a bad example and cause ov	26	-1	-0.30	4	1.89*	0	-0.12	1	0.53
17	Car buyers will still choose the peak performance, even if t	17	1	0.56	4	1.54*	1	0.41	-3	-1.30
29	For a family of 3-5 members 1 car is enough.	29	-2	-0.98	2	0.84	-1	-0.39	0	-0.00
39	By public transport you can comfortably get almost anywhere	39	0	-0.09	2	0.77	0	-0.10	-2	-0.53
24	Those with higher incomes have the duty to drive the least p	24	-1	-0.32	1	0.43	-2	-0.65	-3	-1.28
6	We must accept that traditional cars shall be excluded from	6	-2	-0.82	1	0.39	-3	-1.25	3	1.30
21	Everyone in Budapest should be obliged to buy a public trans	21	-4	-2.03	-2	-0.70*	-4	-1.79	-4	-1.77
30	The car is not something that a person lends.	30	-1	-0.57	-3	-1.32	0	0.14	1	0.49

The "Environmentally Conscious" disapprove of the company cars (which are perceived as "no cost" by the drivers, but actually cause overspending); do not consider private vehicles to be exclusively personal belongings and support their efficient use; rather agree, than disagree with the necessity to replace traditional vehicles with electric ones, and similarly line up with the opinion that people with higher income shall support the environment through their choice of cleaner vehicles.

The respondents of Factor 2 also express positive opinion about the convenience of public transport, but at the same time refuse the idea of having a mandatory travel pass to public transport.

3.2.3. Preferences of the "Comfort Lovers" group

Table 6 shows the distinguishing statements for Factor 3 ("Comfort Lovers") as compared to the other factors.

Table 6. Distinguishing Statements for Factor 3 ("Comfort Lovers")

(P < .05 ; Asterisk (*) Indicates Significance at P < .01)
Both the Factor Q-Sort Value (Q-SV) and the Z-Score (Z-SCR) are Shown.

			Factors							
			1		2		3		4	
No.	Statement	No.	Q-SV	Z-SCR	Q-SV	Z-SCR	Q-SV	Z-SCR	Q-SV	Z-SCR
38	The bigger and more expensive the car is, the greater the re	38	-3	-1.11	-2	-0.89	4	1.96*	0	-0.04
3	Public transport is inferior to using your own car, even if	3	-2	-0.95	-4	-1.49	4	1.80*	-1	-0.30
7	Street parking fees in Budapest are unrealistically high, bu	7	-3	-1.21	-1	-0.44	3	1.56*	0	0.06
23	The longer the time you spend in the city center, the more i	23	3	1.40	3	1.36	-2	-0.47*	2	0.75

In a nutshell - the "Comfort Lovers" enjoy using big and expensive cars, consider public transport inferior and prefer to avoid it in favour of the passenger car, even if they want to spend more time in the city center and have to park in places with high parking fees.

3.2.4. Preferences of the "Rich and Prudent" group

Table 7 shows the distinguishing statements for Factor 4 ("Rich and Prudent") as compared to the other factors.

Table 7. Distinguishing Statements for Factor 4 ("Rich and Prudent")

(P < .05 ; Asterisk (*) Indicates Significance at P < .01)
Both the Factor Q-Sort Value (Q-SV) and the Z-Score (Z-SCR) are Shown.

			Factors							
			1		2		3		4	
No.	Statement	No.	Q-SV	Z-SCR	Q-SV	Z-SCR	Q-SV	Z-SCR	Q-SV	Z-SCR
5	Traffic jams can be eliminated by introducing an appropriate	5	0	0.16	1	0.36	1	0.17	4	2.04*
6	We must accept that traditional cars shall be excluded from	6	-2	-0.82	1	0.39	-3	-1.25	3	1.30
12	People do not even think about how much it costs to maintain	12	0	-0.23	0	0.35	-1	-0.36	3	1.30
38	The bigger and more expensive the car is, the greater the re	38	-3	-1.11	-2	-0.89	4	1.96	0	-0.04
4	If the local government would only allow electric cars in th	4	2	0.68	3	1.42	2	0.82	-1	-0.49*
35	Old, less modern vehicles shall be punished by a higher tax.	35	1	0.56	1	0.45	2	0.84	-2	-1.00*
17	Car buyers will still choose the peak performance, even if t	17	1	0.56	4	1.54	1	0.41	-3	-1.30*
31	If the taxi was cheaper, more people would leave their cars	31	3	1.10	-1	-0.49	-1	-0.41	-4	-1.79*

On the basis of the above distinguishing statements and my individual conversations with the respondents of Factor 4, the "Rich and Prudent" can be described as people who would not let their cars at home even if taxi became cheaper, they would welcome any congestion charge to scare away other drivers and to keep driving. Probably for similar reasons, they accept the idea to exclude traditional vehicles from the city and allow only electric vehicles there, as they can easily afford to have such vehicles. At the same time,

they never overspend and know exactly what vehicles they buy and how they want to use them. Having interviewed the responders personally (all of them have enough income to afford any car), I believe their disagreement with Statement 17 *(Car buyers will still choose the peak performance, even if they cannot make use of it)* is genuinely true and shows real prudence, as none of them ever buys a car above their actual needs and they utilize each respective vehicle they purchase with maximum efficiency. They are unique in their agreement with Statement 12 *(People do not even think about how much it costs to maintain their cars - depreciation, taxes, annual service and repair, fuel, parking fees, tolls, etc.),* to which the respondents from the other factors are largely indifferent. Their attitude to Statement 38 *(The bigger and more expensive the car is, the greater the respect is)* is neutral, because they use the cars pragmatically and are not tempted to impress anyone by buying something big and expensive, they only buy it when they really need it.

Interestingly, after scrutinizing the statistical data of the P-set, I found that the respondents of the "Comfort Lovers", who strongly agreed with Statement 38, had modest vehicles in their households, as opposed to the car park of the "Rich and Prudent", for whom gaining more respect through bigger and more expensive cars was not a challenge anymore.

To summarize the attitude of the "Rich and Prudent" - they are ready to pay, but want to keep driving.

3.3. Consensus among groups

On Table 4 the Consensus Statements are shown. Although there seems to be general agreement on five statements altogether, in fact on three of the statements the opinion of the respondents is only relatively similar. For example, the Statement 1 *(The developed countries should support the public transport in China, India and other developing countries with rapidly growing population, because otherwise their huge car park may cause too big global impact)* is really welcomed by "Comfort Lovers" and by "Rich and Prudent", but the other two groups have produced although positive, but close to neutral attitude.

Similarly, only the "Environmentally Conscious" and the "Comfort Lovers" gave a definite negative response to the idea of Statement 22 to provide all adult family members with their own cars; the other two groups were also rejective, but not at all that explicit. Still I consider it a positive phenomenon that as a whole the idea was declined.

Statement 16 *(Most of the customers of electric cars choose them not because they are environmentally friendly, but because they are a status symbol)* also produced consensus. "Environmentally Conscious" and "Comfort Lovers" agreed, while "Speeding Drivers" and "Rich and Prudent" were neutral on the subject.

I already described the supportive attitude of all four factors to Statement 28, when first discussing Table 4 above. Statement 11 *(The urban traffic jam is no problem in terms of time, because while you are driving you can usually make phone calls, carry out negotiations, talk, listen to music)* is the other example of full consensus on behalf of all four factors. All of them strongly rejected Statement 11 with the respective scores of

-1.32, -1.16, -1.53, -1.53.

For comparison, in the first run with the outliers the results of the factors were

-1.33, -1.26, -1.52, -1.52.

In my opinion that is a very noteworthy sign, because the biggest problem, which this statement succeeds to highlight, seems to be not that we cannot do useful things and be efficient while being stuck in city traffic, but something totally different. Perhaps, simply the emotion that we are not going fast, the bad/stressful feeling that we will be late for a meeting, etc. So why not use a faster mode of transportation - public transport or taxi? Perhaps due to a more powerful negative emotion associated with public transport - lack of safety or hygiene, increased vulnerability, decreased comfort. This assumption was confirmed when one of the interviewees added a handwritten comment at the bottom of the questionnaire, saying that she avoided public transport in order not to catch an infection.

4. Summary and recommendations

The outcome of my research (point 4.3) strongly confirmed my hypotheses:

- Passenger car buyers and/or users in their choice of personal cars are motivated by convenience, social status, cost efficiency and not by environmentally friendly attitude.
- When choosing the means of travel in the city, citizens are mostly motivated by convenience.
- However strong the environmental commitment of the citizens is, in itself it will never be enough in terms of personal city mobility, because their desire for safety and comfort is stronger.
- Consequently, the sustainable mobility modes based on minimal private car use cannot be expected to spread spontaneously without the strong limitation of the current conventional mobility based on private car use.
- All respondents of my research saw personal driving as the best option for city mobility. Some openly oppose car-free days and dislike parking fees (Speeding Drivers), some admit to prefer big and expensive cars and consider public transport inferior (Comfort Lovers), others verbally support public transport, but prefer not to use it (Environmentally Conscious); or readily agree to possible future congestion fees due to the expectations that it will reduce traffic volumes and only they themselves will keep driving (Rich & Prudent).

One of the most positive findings during the investigation of respondents' opinion was the negative reaction to the idea of providing all adult family members with their own cars. This shows that all investigated groups exhibit clear sensibility and correct judgement regarding excessive waste and are able to limit themselves to a certain extend.

Additionally my research revealed that **even if a group of people fully agrees with the importance of some measures, it will not make them automatically accept these measures for themselves**. Like the importance of speed limitation for safety, with which all people will easily agree, but not all of them will accept the strict GPS based speed control.

So even if citizens would generally agree that something should be done to make city mobility sustainable, they might probably choose the least inconvenient path for themselves, and we cannot blame them for that - just imagine yourself and your own family!

The time is ripe to offer different patterns. There is no need to make everyone in the city an everyday driver or an everyday pilot. We can be more mobile than ever even without driving our own family car or our company car. It is time to change the old "dream image" of car ownership, to replace the false prestige of the urban driver with the modern image of the free urban movement backed by affordable, safe, professional and accurate public transport working like precision mechanism around the clock. We shall one day eliminate the time unnecessarily lost in traffic jams and parking "expeditions" around the block, we can reduce our driving distances and we must increase active travel like walking and cycling, and lessen the burden of the automobiles on the environment and on our quality of life.

Based on my research I can voice the opinion that modern municipalities can make cities better places to live by consistently reducing personal driving and constantly enhancing public transport and the green modes of personal transportation.

5. Publications on the topic of the dissertation

1. Tkatchenko, R. (2009). The Hybrid-Electric Vehicles (HEV) – History, Possible Future, Pros and Cons. In: S. Kerekes, M. Csutora, & M. Székely (Ed.), Sustainable Consumption, Production and Communication, Budapesti Corvinus Egyetem., pp. 135-143.
2. Tkatchenko, R. (2011). The evolution of the car making industry. Vezetéstudomány XLII. évf., vol. 4., pp. 38-45.
3. Tkatchenko, R. (2013). The use of methane as automotive fuel – a step to sustainable economy? Vezetéstudomány XLIV. évf., vol. 12., pp. 1-9.
4. Tkatchenko, R. (2013). Personal Mobility In The Context Of Sustainable Development, Journal of Environmental Sustainability: (ISSN: 2159-2519) 3 (3) pp. 49-71.
5. Tkatchenko, R. (2017). Személyes mobilitás a fenntartható fejlődés kontextusában. In: Bodor M; Kerekes S; Zilahy Gy (szerkesztők) - „Jót s Jól!": 26 tanulmány a fenntarthatóságról. „A hazai fenntartható fejlődés vezérfonala" - „Blueprint for the Hungarian Sustainability" c. konferencia lektorált, szerkesztett anyaga. Konferencia helye, ideje: Kőszeg, Magyarország, 2017.01.20-2017.01.21. Kőszeg: Felsőbbfokú Tanulmányok Intézete, 2017. pp. 226-233. (iASK–KRAFT Könyvek) (ISBN:978-615-80529-8-6) Nyelv: Magyar