RESEARCH JOURNAL OF THE UNIVERSITY OF GDAŃSK

Transport Economics and Logistics Vol. 71 (2017)
DOI 10.5604/01.3001.0010.5733

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THE IMPORTANCE OF AUTOMOTIVE INDUSTRY IN SHAPING HABITANTS MOBILITY IN FUTURE CITIES

Abstract

The paper is a summary of different kinds of sources linked to the role of automotive industry in shaping mobility in future cities. This research fills existing research gap, identified in previous research, and also presented in the Introduction and Literature review sections. The research was conducted with the use of systematic literature review. Research results describe the role of cars in future urban mobility systems and the solutions helping to meet new mobility requirements of urban residents.

Keywords: mobility, logistics, automotive, car, future city, urban planning, city

Introduction

Today more people live in cities than in rural areas[1]. It is estimated that city and suburbs habitants will reach 70% of the global population in 2050 (Priester et al., 2014). What is more, never before so many goods and people have been transported globally. Additionally, consumers are more and more demanding, they are called "next generation consumers" or "next-gen consumers" (Firnkorn, Muller, 2015). This also applies to mobility. Mobility demand has been found by D. Metz as inelastic and increasing with improved infrastructure (Metz, 2008). It was always connected with human development history – migrations, wars, exploring new continents etc. (Kammerlander et al., 2015). Many elements of city life are adjusted to the individual, private transport, that is why the lack of sustainable, multimodal infrastructure can be seen in the city (Sha et al., 2013). The global society is addicted to the car. It results in environmental pollution, noise and many diseases (Kammerlander et al.,

[1] According to data from the UN, population living in cities in 2050 is expected to reach 6.3 billion. See in *The Connected Automobile Nears Critical Mass* (2015).

2015). But from a couple of years, the "peak car" phenomenon can be observed, car use has stopped and is decreasing in some regions (Thomopoulos, Givoni, 2015). That has been generating many problems in logistics in the city (Jezierski, 2002; Chaberek-Karwacka, 2015).

Future mobility in the city and rural areas will be characterized by growing complexity. Mastering this complexity will be made by strategies adjusted to megatrends and based on market innovations (d'Gama Rose, 2017). The growing demand for mobility and the differences between specific world regions in this respect (and between types of locality) were observed and predicted already by A. Schafer and D.G. Victor (Schafer, Victor, 2000). The future mobility will be sustainable mobility – societies are just now aware of costs of today's transport and, especially young generations in developed countries, declare resource-saving lifestyle (Winterhoff et al., 2009). Future mobility will be also created by older generations – Baby Boomers and X generation[2], but it is not clear, in what way (Siren, Haustein, 2013), because their mobility patterns are evolving over time (Thomopoulos, Givoni, 2015). It is caused by a number of changes, among others:

– multidimensional evolution of cities;
– sharing economy model;
– glocalization (globalization and localization), also in automotive industry[3];
– shortening product life cycles in the automotive industry, the development of autonomous vehicles, the appearance of electric mobility;
– shortening innovation cycles;
– technology convergence;
– Industry 4.0;
– emphasis on sustainable development, including the development of transport.

Because of these changes the automotive industry has to reshape strategies to meet new customer requirements. It has to find a new place in future mobility systems, especially in cities (Kellermann, 2011). There are only few research articles about automotive mobility future, mostly about electric mobility or low-carbon mobility, but still, this research field is unexplored. There are no research papers about the role of the automobile industry in shaping urban residents' mobility in the future, although city transportation systems agendas and strategies can be found. This research field is interdisciplinary because it connects urban planning, society studies, logistics and transportation in one research subject.

The aim of the article is to answer a research question: How will the automotive industry influence on shaping mobility patterns and urban space? The paper is organized as follows. Firstly, transportation systems and mobility patterns are described. Secondly, research methodology is presented. Then, research results are listed. In the end, conclusions, research contribution, limitations and future research directions are drawn.

[2] Baby Boomers – people born in 1946–1964; X generation – people born in 1965–1983; Y generation – people born in 1984–1995; Z generation – people born after 1995.

[3] Automotive industry in this research paper includes automotive supply chains for passenger cars in premium and mass segments: 1, 2, 3-tier suppliers, manufacturers, 3PL, 4PL (if exists), dealers.

1. Literature review

1.1. Mobility in future cities

The number of megacities will continue to grow. Rural population will decrease. Cities will be smart – sustainable, intelligent, digital, connected and innovative (Firnkorn, Muller, 2015). IT systems will support almost every part of city functioning – also transport. Today many cities use intelligent transportation systems to plan their capabilities in particular areas within the city. Effects of these are lower congestion, higher safety, and better control. Digital solutions will allow to the communication of infra- and suprastructure (see in: Wasielewska-Marszałkowska, 2016) – everything will be connected according to Internet of Things concept. The smart city will be a part of the smart economy, governed by the smart government, inhabited by smart society, living in a smart way, presenting smart mobility patterns (Ishida, Isbister, 2000). These cities will be network cities, characterized by social inclusion, efficient transit, innovative businesses. Their living cycle will be planned according to urban mobility plans. The differences and contrasts between private and public transport, individual and collective will be blurred because of new business models and forms of transportation. Mobility platforms, existing in a large number today, will be very popular among city residents (Röhrleef, Deutsch, Ackermann, 2015).

Today many long-term sustainable urban mobility plans (SUMP's) are made for cities having problems with environmental pollution and congestion (Nelson, 2016). Cooperation between local authorities, residents and private sector can result in efficient mobility system (Economides et al., 2012). Repositioning of urban transport systems will be possible only with the use of ICT systems, especially Intelligent Transportation Systems (Nelson, 2009). They have based also on multimodal mobility and blurred borders between private and public transport. Nevertheless, public transport system should be changed dramatically to respond to new demand characteristics in the area of mobility. A car will be owned by individuals, private and public companies. It will be a source of income. New mobility services will be offered in different sales channels, especially B2B and B2C, but also C2C. Many web platforms offering car-sharing, charging and parking will emerge, they are already present in today's transport systems and are developing very fast (Strasser et al., 2015).

Mobility is now one of the main elements of human activity. Mobility is secondary to some primary needs, like work, education, healthcare, leisure. The demand for mobility will be growing exponentially (Spickermann et al., 2014). Urban areas will generate more demand in this regard –both related to time and space (Wegener, 2013). They should be perceived as flexible, complex, living systems. Future mobility will be characterized by: "zero emission", "low carbon", "electric", "shared", "autonomous", "green" and "sustain" (Phillips et al., 2013). But, different generations, including Baby Boomers, generations X, Y, and Z will have other targets and needs in everyday life. But still, regional differences will be visible among world's cities (KPMG, 2014).

Growing technology addiction will result in realizing the Peter Sale's scenario of Technopolis, characterized by connected, fragmented, dispersed society. There is also another possible scenario is about eco-friendly urban future, based on sharing economy solutions (Shared mobility system). The last one is the most traditional, similar to today's dominated by private car ownership, even if there will be high charges in the city (Controlled mobility). Dennis and Urry supplement this scenario group by Local sustainability concept about self-sufficient, socially oriented urban society (Julsrud, Uteng, 2015).

Differentiation of transport modes will include micro mobility – use of small vehicles with and without engines, bicycles, new routes, infrastructure for pedestrians etc. The choice of means of transport will be less routine than today. Multi-optional users will choose different transport modes on the basis of special algorithms calculating prices in real time. There will be plenty low-cost offers, also low-priced cars and low-priced long-distance buses (Feige, 2010).

1.2. A car and mobility patterns

It is now known, that future city transport will be sustainable, energy-efficient and low-cost. Mobility infrastructure will be planned in long-term with taking into account future structure of urban society. Many pedestrian and bicycle areas will threaten car transport, but a car will be still a very important mean of transport. Many non-residents of the city will live in the suburbs or further – in rural areas relatively close to the city. They will need health, education and entertainment services, so they will use the car to go to the city. All mobility patterns, both represented by residents and non-residents should be analyzed before planning city transportation system. Nevertheless, to achieve objectives of sustainable urban transport, car traffic should be minimized. Therefore, a number of solutions will be implemented, including pay zones and entrance prohibition. But mobility of people from rural areas will be linked to the car, so park & ride zones will be crucial to meet their needs and reconcile them with the sustainable vision of the city (Szmelter, Woźniak, 2016). Available, attractive, fast, reliable and cheap public transport should provide an attractive alternative for people traveling within the city area (Jiang et al., 2015). Public transport should be more competitive to private car transport by providing available transport services, also between cities (a good solution can be high-speed train transport).

Future (even in some cases current) automotive industry will respond to new market needs. New mobility patterns will be supplemented by new business and services models, like car sharing and hitchhiking of the new generation, renting a public car or intelligent drive, which will be a part of a new market area called Mobility as a Service. It is estimated that 30% of cars in cities can be shared in 2050 (Szmelter, Woźniak, 2016). Autonomous, electric, low- or zero-emission vehicles will dominate the market. New kinds of vehicles will appear in cities – they will be smaller than today's city cars, but more environment-friendly. It can be seen on the small scale even today – in London, Berlin, Rotterdam or Singapore. The whole infrastructure will be transformed into multimodal one – everything

will be uniform, the predictability of traffic participants behavior – high. Thanks to sharing solutions poorer people will use new cars. Access to the Internet and digital solutions will be a part of every car. Route optimization, traffic analysis, car sharing, car renting, car connection and other services linked to car mobility will be used as a standard solution in every car. Public companies will offer car renting as a part of their product portfolio.

According to KPMG's Global Automotive Executives Survey 2015, new technologies are now a part of automotive companies, which, surprisingly, are mostly interested not in environmental issues but in standard solutions: combustion engines, product platforms, modularization, commonality. These priorities are linked to customer needs on emerging markets, which expect ultra-low-cost cars and other new car segments according to their dynamic growth (KPMG, 2015). In the future, a split into the Western and Eastern parts of the world will be visible in the context of mobility patterns (see Table 1), but every of these societies will reconsider car ownership. However, the Eastern part of the world will be less inclined to give up buying a car for its rent.

Table 1. Types of future mobility behaviour

Type of mobility	Description
Triad countries (Western Europe, USA, Japan)	
Greenovator (27%)	A dominant type of mobility in the future Combines care of the environment, work-life balance, high quality of life Restrained in pursuit of luxury and a consumerism goal: environmental aspects, running costs, product durability
Family Cruiser (11%)	Patchwork family members – mobility is necessary, because of frequent visits to family members Mobility means high quality of life Use of inter-family car sharing Goal: unlimited mobility for all family members
Silver Driver (24%)	Drivers aged 50 and over Focused on enjoying life, new experiences, adventure, fun, sports competition, participation in social life Goal: preserving the autonomy of mobility, comfort, safety
High-frequency Commuter (24%)	Job nomads, have to commute daily (far away) to work Usually, residents of suburban areas, looking for the possibility of effective, flexible movement in the metropolitan areas Mostly women Usually, rides funded by the employer The car is a dominant mode of transport Goal: low cost, speed, flexibility
Global Jet Setter (2%)	Constantly on the move, often change location (also in the field of housing and work) Multi-mobile workers, smart mobility services-oriented, can professionally manage the mobility Goal: quality of life, comfort, luxury, speed
Sensation Seeker (4%)	Like to drive a car for pleasure, it is a second home for them, combine it with individuality and freedom Their behaviour is related to the trend of the new ecology Goal: recreation, high quality of life, self-realization

Type of mobility	Description
Low-End User (8%)	Cost-oriented Looking for inexpensive mobility solutions, are able to give it up for the lower cost of living Goal: low costs
BRIC countries (Brazil, Russia, India, China), also other developing countries	
Basic (48%)	Having their own car gives them social advancement For them, mobility is a sign of modernity and participation in the global economy A very large group Goal: saving energy, low price of a car, functionality
Smart Basic (43%)	Looking for mobility solutions that highlight their social advancement More focused on comfort and individuality than basic consumers Not only want to imitate consumers from the West but also focus on issues related to environmental protection and CSR Goal: comfort, individuality, low cost, environmental aspects
Premium (4%)	Perceive luxury as an expression of self-esteem and social status Accept high prices Focused on originality Goal: luxury, individuality
Others (5%)	

Source: (Szmelter, Woźniak, 2016)

2. Methodology

In this study, to analyze the approaches to car role in shaping people mobility in future cities, a method of the systematic literature review was used. There is a lot of research procedures linked to literature analysis, but the most often cited are classical procedures described by Cochrane[4]. In this study, a newer approach to literature review was implemented, which is procedure presented by Tranfield et al. (2003) and Denyer and Tranfield (2009). This method allows for state-of-the-art analysis and identification of potential research gaps. It is used also for concluding about homogeneity or heterogeneity of research results in the current literature. This research is a qualitative study, and, according to mentioned literature, transparent, replicable, exclusive, aggregative and heuristic research. That is why the main result of this research is a descriptive report in Research results section. The research procedure is described chronologically in Table 2.

Table 2. Research procedure

Phase	Stage
I	Determining the study purpose
II	Determining basic literature
	Selection of publications
	Preparing publications database

[4] Cochrane Collaboration specializes its research in healthcare and medicine. See in: Cochrane (1972).

Phase	Stage
III	Bibliometric analysis
	Content (text) analysis
IV	Preparing a report/paper

Source: (own elaboration based on: Denyer, Tranfield, 2009)

Table 3 presents the process of literature selection and analysis. Firstly, the literature search engines were chosen according to their range and scope. It was decided to choose the biggest engines and, at the same time, often used by researchers to increase the replicability level for other researchers. There were 6 search engines chosen to this research: DOAJ, EBSCOhost, Google Scholar, Infona, ScienceDirect and Web of Science. After this step, the Boolean Logic was used to identify the literature to further analysis. The inclusion criteria were keywords in title and text of research paper. Also, the publication year was taken into account, because the Author decided, that forecasts about future mobility, made before 2009 are not reliable because of constantly changing the global business ecosystem. The other reason was the last global economic crisis in 2007–2009, which changed many areas in world's economy and started new research in areas linked to environmental issues, energy, automotive and many others. This crisis generated huge financial problems in the whole automotive industry (big sales decline, bankruptcies, government financial aid, mass layoffs) and a need to modify supply chain management. Because of these difficulties all previous forecasts were recognized as unreliable. The research process was modified in the case of Google Scholar search engine because of a big amount of results, impossible to analyze during the research process.

Table 3. Process of literature database creation

Literature search criteria	Publication search engine					
	DOAJ	EBSCOhost	Infona	ScienceDirect	Web of Science	Google Scholar*
"mobility" and "future" in title, "city" or "urban" and "automotive" in text; publication year: 2009 and later	5	159	112	30	2	10
Full texts available	1	81	39	26	1	10
After abstracts verification	5	11	17	17	1	9
After removing duplicates	42					
After text analysis	22					

* Due to plenty of results (529), the researcher decided to modify the search and the word "city" included in the title and set the target file type as pdf
Source: (own elaboration)

Only studies that meet the inclusion and exclusion criteria are included in the review. Literature used in this article is based mainly on scenario-related methods. Selected research papers were analyzed taking into account abstracts (in the early phase of selection) and the content (in the later phase). The analysis rules in the last step of literature selection were (in addition to keywords):

– Language of paper – only English language;
– Research method – no restrictions in this area;
– Key findings related to future mobility and, at the same time, automotive industry or car as a mean of transport in the city of the future.

The efforts were made to prepare a report to represent high-quality evidence for the possible roles for the automotive industry in shaping urban areas in the future. Because of a low amount of selected papers a statistical analysis was not a good method to be included in the research procedure. In order to conduct the study, coding and observation sheets were used to unify all issues related to the topic of research, and fragmented in the individual items of literature considered for analysis.

Because of specific nature of systematic literature review in economics, the output of the analysis is heuristic, so contains many suggestions, guides, possible scenarios, trends, possible solutions, useful to solve managerial problems (Denyer, Tranfield, 2009). The results can be used both by practitioners from the private and public sector, as well as by other researchers to prepare their own studies. The aim of this study is stated to meet possible needs of different stakeholders interested in transport development, car development, city residents' mobility and other related areas.

3. Research findings

The chosen research papers were analyzed in order to identify, what are characteristics of future mobility, especially in regard to car usage. Research findings were divided into two parts. The first one is connected with life areas linked to mobility. The second is the main part of research results and describes urban mobility system elements related to the car, and, inevitably, to the automotive industry.

3.1. Life areas linked to urban mobility

As can be observed (see Table 4), according to selected authors' research, future society will be different than today's. Aging population will have an impact on mobility in cities, a lot of elderly people (described today as X generation, born in the 60s and 70s in the twentieth century) will use means of transport to travel within the city. Firstly, they have a driving license in large extent. This is the opposite situation to this of Baby Boomers, born after the Second World War, who couldn't afford a car, presented lower driving license ratio, especially among women. Also, gender gap will be visible – women will be more willing to use public transportation solutions than men. Differences between genders in this area will

be clear and transparent when they will be 50 and more years old. Nevertheless, elderly people will work longer than today, also because longer life expectancy, and if they retire, they will use a wide range of services in the city. That will generate mobility needs and will impact on urban mobility system.

Decreasing number of children (visible now), and in the future – increasing (according to some forecasts) will not change the trend of work emancipation of women. Most of the households will be double-income. Women will need means of transport to commute. Today the development of suburbs is strong, but in the future, more people will be willing to change their place of living into one in the city center to minimize commuting.

Table 4. Habitants' life characteristics in the future city (related to mobility)

Area	Characteristic	Sum	% of analyzed research papers
work	living close to the workplace	4	18.18
	more home-based offices, flexible work time	3	13.64
	teleworking (incl. teleconferencing)	16	72.73
	dual-income households	2	9.09
gender & age	the gender gap in work and using a car	5	22.73
	active elderly people	8	36.36

Source: (own elaboration based on: Howley et al., 2009; Feige, 2010; Dubois et al., 2011; Economides et al., 2012; Desai, 2013; Siren, Haustein, 2013; Wegener, 2013; Cascetta, 2014; Kollosche, 2014; Lennert, 2014; PR Newswire US, 2014; Spickermann et al., 2014; Urban Foresight Limited, 2014; Julsrud, Uteng, 2015; Kammerlander et al., 2015; Lennert, 2015; Shergold et al., 2015; Singh, 2015; Strasser at al., 2015; Thomopoulos, Givoni, 2015; GRID 3.0, 2016; d'Gama Rose, 2017)

When talking about work, people will change their working modes. They will live closer to the workplace if they have to be in the office every day. But, home-office work and teleworking will be spreading both in the developed and developing countries. Flexible work conditions will cause less congestion and adjusting work hours to family life and spouses daily cycle (for example education in the case of children). This will be also one of the causes of women work emancipation.

3.2. Urban mobility issues related to the car and the automotive industry

The role of the car in urban mobility system will change, like the whole mobility system. Urban planning will prioritize more creating space for pedestrians and bicyclists, creating green areas and multimodal transportation model. Special urban mobility systems planning programs will be implemented. This trend is observable also today, for example in Sacramento (USA) (Creating a Sustainable City, 2017), Lisbon (Portugal) (Urban Mobility System Upgrade, 2017), Berlin (Germany) (The Future of Urban Mobility, 2017), Stockholm (Sweden) (Urban Mobility Strategy, 2017) and many other cities.

Future public transport system will be characterized by good access to multimodal infrastructure and by customers – pedestrians and bicyclists, preferring an active lifestyle, sports activities traveling within the city. The new face of transport

infrastructure and accessibility to services are mentioned in the literature as the most crucial factors of the urban transport system (see Table 5). Public transport service providers will have to change their product portfolio to meet the changed needs of customers. They should create a wide range of mobility services, including car renting, bicycle renting, rail transport solutions, but also new pricing procedures (individual pricing, services on demand with flexible, multi-variable price calculation made by smartphone IT applications). In some cases, local authorities can consider free city transport system for all users, for example, to reduce congestion caused by car traffic. Both public and private service providers can offer new mobility services, starting from IT applications or services of planning individual and collective mobility (for example in the case of couriers), extension of today available e-commerce services, IT platforms for carsharing, bicycle-sharing, online payment methods, repair services and insurance packages for fleets, IT services for transport service providers, new applications for mobile devices etc.

A new trend in the city transport system is pursuing to the low carbon, circular mobility. This has two dimensions: low greenhouse gases emission and circulation of assets to use their maximal potential. The role of automotive industry is to ensure right products (cars) to enter into mentioned goals. That is why a new dimension of using a car is necessary. Firstly, the process of using a car will change. There will be high fares for driving and parking, so cars will need to circulate within the city, what will cause rising demand for car sharing and car renting. Also, park & ride systems will be used to avoid these fees by individual drivers, not willing to rent their car while not using it. Secondly, the car itself will need to be more environment-friendly. This aim will be achieved by offering zero-emission vehicles using renewable fuels like electric, solar or hydrogen cells. That is why e-mobility will develop mostly in cities. This will be simultaneous and independent from autonomous mobility increase, which will bring a new comfort standard in traveling, not only to the city but will change drastically demand for taxis in the city. Thirdly, the new segment of cars will emerge – linked to micro mobility, so building the network of small vehicles, shared, rent, connected with each other. This new segment will be a chance and a challenge for the automotive industry, tackling with today's needs for small, ultra-low-cost cars for Asian cities.

Table 5. Urban mobility systems elements (including car-related issues)

Area	Characteristic	Sum	% of analyzed research
urban planning	more green space	6	27.27
	implementing special urban mobility system planning programs	11	50.00
	locating amenities close to residents	5	22.73
public transport system	good access to the public transport (also for suburbs)	16	72.73
	renting of cars and bikes by public transport service providers	6	27.27
	intermodal/multimodal infrastructure	13	59.09
	the free public transport system	2	9.09
	individual pricing for residents	7	31.82
	more rail transport	5	22.73

Area	Characteristic	Sum	% of analyzed research
new mobility services inside and outside the city	maas	7	31.82
	more repair services	1	4.55
	work-, travel- and mobility planning	6	27.27
	IT services	19	86.36
	e-shopping, e-commerce	6	27.27
using a car	low car ownership ratio	7	31.82
	high fees for driving and parking	5	22.73
	high car sharing or car renting	13	59.09
	park & ride systems	7	31.82
vehicles in the city (related to low carbon mobility)	Zero-emission vehicles	14	63.64
	e-mobility, electric vehicles	6	27.27
	autonomous vehicles	9	40.91
	cargo bikes, cycle-sharing, and micro-mobility	10	45.45
	using renewable fuels (electric and hydrogen fuel cells)	11	50.00

Source: (own elaboration based on literature mentioned in the source of Table 4)

The development processes in the product dimension in the automotive industry will be fueled by specific residents' needs and interests while using a car. A car will be not the best mean of transport in the future because of lack of parking places, high fees within the city etc. So the needs of city habitants in order to use a car will change and that will initiate some new solutions, not only in products but also in additional services (see Table 6). Customers will declare such needs as low prices, environmental protection, comfort, luxury and individuality, independence, high quality of life etc.

Table 6. Automotive industry activities in order to meet new mobility demands

Priorities of city residents related to mobility*	Examples of automotive industry activities influencing shaping of mobility patterns
low cost of ownership	Introduction of low-cost car rental services by fleet operators and car owners (peer-to-peer car rental) Reduction of engine capacity, increase in engine economy
environmental protection	Reduction of exhaust emissions in subsequent models Introduction of new types of engines (electric, hydrogen-fueled, fuel cells, etc.) Introduction of solar cars
comfort	Introduction of semi-autonomous and fully autonomous cars (without drivers) Development of IT applications to make driving easier Introduction of automatic parking systems Introducing the Automated Highway Driving Assistant
luxury	Increase in the number of electronic components, including those related to audio and video, and Internet connectivity Increase in the number of product variants (the more expensive segment, the more variants to choose from)
originality, individuality	Increase in the number of product variants (in all segments) Possibility of designing the car by customer himself (prosumer concept)

Priorities of city residents related to mobility*	Examples of automotive industry activities influencing shaping of mobility patterns
speed	Product development towards maximizing vehicle speed Development of communication between the vehicles (Internet of Cars) to avoid obstacles on the route (e.g. traffic jam)
high quality of life	Offering high availability of vehicles within the city Offering high-quality car rental at an affordable price
flexibility	Mobility-as-a-Service (MaaS) solutions Development of carpooling 2.0 (e.g. applications provided by fleet owners) Introduction of on-demand ordering services through e-hailing
product durability	Introduction of multi-variant offer in the field of service and after-sales service
independence	Offering opportunity to use a more or less expensive car without having to purchase it
security	Increase in the number of safety-related components, such as laser obstacle detectors Introducing Adaptive Cruise Control Technology, which allows quickly detecting and avoiding objects while driving or braking the vehicle Introduction of Autonomous Driving Highway, which allows completing transfer of driving to this vehicle
low price	Introduction of ULCC (ultra-low cost car) segment
functionality	Increase in the number of electronic car control systems
entertainment, recreation, self-realization	Extending car's audio and video system functionalities (both hardware and software) Creating an entertainment system for the user of a standalone car

* according to an occurrence in the identified literature
Source: (own elaboration)

There will be few concepts of solutions to meet these requirements, namely introduction of:

– new services based on MaaS concept,
– environment-friendly engines,
– autonomous cars,
– new safety systems,
– new IT solutions based on the Internet,
– more product variants,
– new repair services.

Conclusions

The development of new technologies has an impact on global society. Successive generations are generating new consumer needs, also in the field of mobility. Some similarities and differences can be observed in different world's regions, especially between developed and developing countries, but also between continents. In emerging markets, some trends can be not yet visible because they are still non-saturated markets (Zhao, 2014; d'Gama Rose, 2017). Nevertheless,

regardless of the region, some technologies will inevitably become part of the global automotive market.

Future mobility has a big chance to be connected with electronic vehicles or these fueled by hydrogen, solar energy or fuel cells. On the other hand, opposite forecasts are also available for the automotive industry (Lenz, 2013).

Research presented in this paper showed some similarities in forecasts on future urban mobility systems. Firstly, transport as a part of logistics system in the city (Chaberek, 2002) will be aimed at meeting users' needs related to new dimensions of mobility (primarily the low cost of ownership and environmental protection). Secondly, car usage model will change in the future. Sharing will replace traditional ownership in the city. In rural areas, the traditional model of ownership will still dominate. Thirdly, in the future city, the car will be included in public means of transport, but new mobility service providers will become individuals, new market players, car manufacturers and public transport companies. Fourthly, new mobility patterns in cities will deepen the differences between car usage models in Triad countries, BRICs[5] and others, so despite the similarities in these markets, car manufacturers and mobility service providers will differentiate their offers. Fifthly, because of previously mentioned changes, new business models will emerge on mobility service providers markets, also in the case of the automotive industry. It will be linked to the car itself and also to a wide range of services: mobility services, repairs, insurance etc.

This paper extends current literature by summarizing available research results from different research methods, research procedures, research samples and geographical areas (mostly Triad and BRIC countries). It is valuable to state some research hypotheses linked to trends in urban transport systems in different countries taking into account global trends. They can be a basis for further comparative analysis, statistical analyses, heuristic research, scenario building and others. There are few limitations of this article. Research methodology concerns only papers with particular search criteria, but there are also many other works dealing with mobility management in urban areas. This is only literature review made without any quantitative data and without empirical research. Also, the geographical area covered by the analyzed literature is not complete (no research is available on the African, South American, Central Asian countries, Australia and Oceania countries).

This research paper can be used by both researchers and practitioners. The researchers can address identified research results in their future works. The practitioners can revise mobility management approaches and logistics strategies. Future research should focus on mobility management in megacities, big and middle cities, SUMPs – their creating, implementing and controlling, mobility development according to Industry 4.0, Logistics 4.0 and Mobility 4.0. These and many other issues in mobility area should be addressed in future research.

[5] Triad countries: USA, Western Europe countries, Japan. BRIC countries: Brazil, Russia, India, China.

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