

PUBLIC TRANSPORT AS A PART OF SHARED ECONOMY

ALICA KALAŠOVÁ¹, VERONIKA HARANTOVÁ², KRISTIÁN ČULÍK³

Abstract

Nowadays, the issue of sustainable mobility is very resonant in the professional public. Main topic for discussion is a transport as a one of the biggest polluters in the world. Today's transport brings a number of benefits to society, but often it has a high price. This price is paid by wasted human lives and serious environmental damage. Therefore there is no wonder that a number of cities, municipalities and regions regard transport as the key to their development, but at the same time as a threat to the health of the population, their safety and quality of a whole life. The combination of public and shared transport is necessary for clean and smart mobility. This paper is focused on above mentioned issues. It describes levels of the smart city concept and principles and forms of shared economy in transport and shared mobility.

Keywords: smart cities; shared economy; public transport

1. Introduction

Transport is one of the key factors for the development of every society. Transport is not a goal itself, but it is only a means of economic development and opportunity for achieving social and regional cohesion. The growing need for human mobility is one of the manifestations of a rich society and the economic success of human behaviour. The development of the society is connected with the development of transport in all its sectors. Transport has a negative impact on the environment from two fundamental aspects: the construction of transport infrastructure and environmental impact of traffic. Road transport, which creates negative externalities, is one of the biggest violators of sustainable development. This is due to the company's increased transport requirements due to the globalization process. Transport is one of the indicators of the measurement of sustainable development through total energy consumption, traffic growth, transport prices and social and environmental impacts [1, 3, 4]. The Slovak Republic set a global objective of transport policy in line with the sustainable development principles. This goal is a sustainable mobility. We can define it as a long-term enhancement of constantly increasing transport needs of the company (transport of goods and persons) at the required time, quality and maximum efficiency. The year-on-year increase in the number of registered passenger cars

1 University of Žilina, Faculty of Operation and Economics of Transport and Communications, Department of Road and Urban Transport, Univerzitná 8215/1, 010 26 Žilina, Slovakia, e-mail: alica.kalasova@fpedas.uniza.sk

2 University of Žilina, Faculty of Operation and Economics of Transport and Communications, Department of Road and Urban Transport, Univerzitná 8215/1, 010 26 Žilina, Slovakia, e-mail: veronika.harantova@fpedas.uniza.sk

3 University of Žilina, Faculty of Operation and Economics of Transport and Communications, Department of Road and Urban Transport, Univerzitná 8215/1, 010 26 Žilina, Slovakia, e-mail: kristian.culik@fpedas.uniza.sk

and the related changes in the traffic situation have manifested themselves in cities and residential areas, where the burden on the environment and the health of the population are increasing, as well as in exposed sections with exceeded traffic intensity, resulting in congestion and accidents.

Mobility solutions and maintaining sustainable development can be enhanced by building Smart Cities. The primary goal of Smart Cities is to find a concept that will provide cities with a sustainable model of development, excellent quality of life, safety and maximum energy efficiency. All of this can be achieved only with the use of modern technologies. According to our environmental law, a sustainable model is: "a development that maintains the present and future generations the ability to meet their basic life needs, while not reducing the diversity of nature and preserving the natural functions of ecosystems" [2, 5, 7]. Defining the concept of quality of life is very difficult in itself, because each of us presents a different quality of life. However, if one definition is to be chosen, then we are inclined to the following [6]: "quality of life is the mental aspect of life as a health, social relationships, the quality of the natural environment, existing living conditions and personal well-being" [8, 9, 12].

2. Smart City

The smart city concept should use the most of intelligent technologies to influence the quality of life in a city in such a way as to create synergies between different sectors (transport, logistics, security, energy, building management, etc.) with regard to the energy efficiency and quality of life of citizens in the city. At first glance, smart cities are no different from "ordinary" cities, but there are no congestions in them and people are more satisfied with them because they know what's going on around them. They also breathe more fresh air and they know that Smart Cities use modern information technologies which enhance the quality of human life. The criteria are different in each city and must correspond to the strategic development plans of a particular city (development strategies, land-use plan, etc.).

The cross-cutting themes in Smart City are [13, 14, 16, 18, 33]:

- Sustainable urban mobility - e.g. electric vehicles for public transport, parking (parking areas), cycling development, etc.
- Intelligent buildings and neighbourhoods - e.g. integration and management of local and renewable energy sources; the use of information and communication technologies; adaptation of energy supplies decentralized from renewable sources in buildings; intelligent urban lighting and the like.
- Integrated infrastructures and processes in energy, ICT and transport e.g. reducing the carbon footprint, intelligent heating, cooling and lighting, etc.

Another definition was made by B. Cohen in his research study - The Top 10 Smart Cities on the Planet: "Smart cities use information and communication technologies to make resources smarter and more efficient, resulting in cost savings, energy, services, quality of life and emissions reduction, all supported by innovation and a low-carbon economy" [20-22, 24, 25].

One of the important ideas is to achieve a change in thinking that is based on the concepts of sharing economy. It is a concept of social change in the 21st century. People do not need to own the things of daily consumption and they are able to use common products thanks to the existing offer of various communication tools. Schemes from areas fall into this concept are:

- transport, e.g. sharing vehicles, bicycles, public transport,
- energy, e.g. shared power generation concepts,
- public space, e.g. sharing investments and activities in joint projects,
- social, e.g. sharing of living space, catering and so on.

Thus, it can be stated that the concept of smart city and economy of sharing leads to decentralization of political and economic power, to economy and to conscious behaviour towards the environment in which we live. The whole concept can be divided into the political level (city management level), social (the level of the population of the place) and technological (the level of business).

3. Shared Economy

It is a concept of social change in the 21st century. A man does not need daily things consumption and is capable of using available common products through the existing range of different communication tools. The basic assumption is effective solutions for the ecological situation. It means that our consumption will be reduced, because the way of life built on high consumption puts a strain on nature raw materials and energy, waste from production and consumption [26, 27]. An important role in this the process of reducing personal material consumption is the transformation of values: "...the preference of certain values and needs is an essential component of human motivation behaviour. If we understand the way of life in a very simplified way, as a summary of human activities, then an environmentally friendly way of life is the result of a radical change in human values" [31, 32]. It is an economic model based on sharing, lending, renting or exchanging products. It can be said that it is the opposite of ownership. People or organizations share their resources, which they have at their disposal and which they do not fully use (e.g. infrastructure). The sharing economy is a recent trend, as it has been strengthened first economic crisis in 2008 and web applications that make it simple, flexible and quick sharing things. It can be said that the oldest form of sharing is the libraries that existed long before the starting of the internet.

So we can say that the concept of smart city and economy of sharing leads to decentralize political and economic power, to economy and conscious behaviour the environment in which we live. The smart city concept can be divided into these levels:

- political (city management level),
- social (population level of the city),
- technological (business level).

Sharing is used in many areas. Used for real estates, books, and equipment or information technologies that the owner does not fully use and he can give capacity to others. Economy sharing thus contributes to changing the structure of corporate spending and organizations, which is reflected in a higher share of purchasing services at the expense of assets and depreciation. Sharing economy is developing very fast, for example small landlords earned over \$ 3.5 billion in 2013. This may mean a noticeable decline in sales in some sectors. This social concept has grown by 25% over the past few years, and for example in the Great Britain shares things or services with 33 million people [1, 10, 23, 26-29].

4. Principles and Forms of Shared Economy in Transport

We used to share things with family and friends. Today we share them with people we don't know. With different platforms, we have the ability to share objects, knowledge, money, experience, networks, content and much more. It is the ability to contribute directly to society and the economy, but on a global scale. It is this development that has opened the door of the world to a shared economy, a world in which we live today and for the future of humanity.

Literature [11, 17] describes three important principles that drive the shared economy forward:

- **Unused items lose value** (unused potential of empty seats in the car and the possibility of getting a passenger).
- **Access to things is better than their ownership.** Today's generations of consumers are not so much interested in ownership and hire or rent things to suit their flexible lifestyle. Easy access also reduces other barriers to the use of products (such as the absence of a driving license or lack of money for an expensive train ticket) and this promotes economic flexibility.
- **Trust:** Globalization has paved the way with a coherent world of business. Over time, social networking sites have contributed to building a virtual reputation that makes it easier for us to work with people we don't know.

One of the cornerstones of Smart City is therefore sustainable mobility. The basis is the use of public transport, which is currently experiencing problems. Modal split (ratio between passenger car and public transport) was 50:50 in 1995 and in 2015 it was 74:26 in favour of individual transport. Average cost per passenger car holder is up to 2,853 € per year. But how to persuade people to use other modes of transport is a very difficult question.

From this point of view, the concept of carsharing – a modern service that helps to reduce the number of cars in the city as well as bikesharing, is very important. These systems contribute to solving parking problems and improving the city's environment.

Carsharing can be defined as a service that allows its customers to use a car without having to own it, or take care of its traffic and maintenance. It can have different forms, from unofficial groups of friends sharing only one car and the associated worries and costs, to a commercial form with a professional company that has a strong technological and legal background. Carsharing is best suited for those who, in their day-to-day activities, walk

either on foot, use public transport or transport by bicycle, but from time to time they need a car to buy more or need to go somewhere where public transport or bicycle use is not the right solution. It is a modern service that helps reduce the number of cars in the city, helping to resolve parking problems, making it easier to access the car when needed and improving the quality of the urban environment.

Carsharing complements greatly with public transport, walking or cycling. One efficiently used carsharing vehicle replaces 4 to 10 privately owned vehicles. Its use is more efficient if the user drives less than 10,000 km per year.

All these systems, if we want to label them as car-sharing, must have several common features:

- organized group of participants,
- one or more shared vehicles,
- decentralized network of vehicle stations near home, workplaces or hubs,
- booking cars before every trip,
- car rental for short periods of time (for one hour, more or less time),
- self-service access to vehicles.

Bikesharing is a service in which bicycles are available for shared use to individuals in the short term. These systems allow people to rent a bicycle from point "A" and return it at "B". The public bicycle system started in Europe in 1965 and a viable format appeared in mid-2000 through the introduction of information technology.

Bicycle sharing systems can be divided into two general categories:

- **Bicycle rental**, organized mostly by local community groups or non-profit organizations;
- **"Smart Bike" programs** implemented by government agencies, sometimes in a public-private partnership.

The main idea of these systems is to provide free or affordable short-distance bicycle access in an urban area as an alternative to mass transit or private vehicles, reducing congestion, noise and air pollution.

5. Shared Mobility

Is public transport a shared mobility? Does shared mobility describe individual mobility, or does it include mass transit services, such as driving in a taxi, bus or car when multiple people travel at the same time?

In order to talk about "shared mobility", there must be an intermediary platform that provides a link between services and users. Most often, such a platform takes the form of a website or mobile app and allows registered users to order and pay for the use of a car, to order a passenger, or to use a shared taxi or minibus service on request.

OECD [15, 19] considers these services to be shared mobility because they use a mediation system. This is the fundamental difference between shared mobility services and regular public transport or classic car rental. The term "shared mobility" means sharing cars, bicycles and so on. Shared mobility includes also digital platforms for ordering taxi or seat in the car (carpooling). Ordinary public transport is not considered to be part of this concept. Shared mobility also does not include classic car rentals, where the user orders a vehicle – not a mobility service.

But if urban mobility is to be cleaner, we must reduce the total number of kilometres driven by motor vehicles. This means increasing the proportion of active modes of transport, such as walking or cycling (without pollutant emissions) by combining them with public transport (lower emissions per person compared to individual use of the car). Buses, trucks, taxis, passenger cars and other vehicles that remain on the move must achieve a higher degree of cleanliness, using technologies or alternative fuels.

It is very important that cities develop the right principles and incentives to make technological innovation bring real effects. A good public transport system is an essential complement to the development of shared mobility, as it remains the best option for the rapid transport of a large number of people. Shared services and the necessary technologies, if they form an integral part of the urban mobility strategy, can fill the gaps and offer a genuine alternative, contributing to the sustainability of urban mobility.

6. Conclusion

In recent years, due to the rising standard of living and the systematic economic advantage of car traffic, individual transport is booming and the current communications network is no longer satisfactory. Traffic collapse, congestion, accidents and other negative environmental impacts are becoming a common part of life, and further communications and interchanges are increasingly being built. The transport situation continues to deteriorate despite major investments in infrastructure development.

Owning less can mean freedom. Not all things are needed on a daily basis. By co-consumption, man not only saves and contributes to improving the environment. It is the same way to socialize, be interested in the surroundings and get to know interesting people.

7. Acknowledgement

This work was supported in part by the Grant VEGA no. 1/0436/18 - Externalities in road transport, an origin, causes and economic impacts of transport measures.

8. Nomenclature

ICT – Information and Communications Technology

OECD – Organisation for Economic Co-operation and Development

References

- [1]. Berezny R., Konecny V.: The impact of the quality of transport services on passenger demand in the suburban bus transport. *Procedia Engineering*. 2017, 192, 40-45, DOI: 10.1016/j.proeng.2017.06.007.
- [2]. Bettencourt L.M.A., Lobo J., Helbing D., Kuhnert C., et al.: Growth, innovation, scaling, and the pace of life in cities. *Proceedings of the National Academy of Sciences of the United States of America*. 2007, 104(17), 7301-7306, DOI: 10.1073/pnas.0610172104.
- [3]. Capek K.: London Street. Travel sketch of English letter. *Writings of Karel Čapek*. Travel, 1980.
- [4]. Culik K., Kalasova A., Kubikova S.: Simulation as an Instrument for Research of Driver-vehicle Interaction. In 18th International Scientific Conference on LOGI. Ceske Budejovice, Czech Republic: E D P Sciences, 2017, 134.
- [5]. Davis S.J., Caldeira K.: Consumption-based accounting of CO2 emissions. *Proceedings of the National Academy of Sciences of the United States of America*. 2010, 107(12), 5687-5692, DOI: 10.1073/pnas.0906974107.
- [6]. Furman J.L., Porter M.E., Stern S.: The determinants of national innovative capacity. *Research Policy*. 2002, 31(6), 899-933, DOI: 10.1016/S0048-7333(01)00152-4.
- [7]. Gehl J. *Life between buildings*. Nadace Partnerství. Brno, 2000. ISBN 80-85834-79-0.
- [8]. Gnap J., Konecny V., Poliak M.: Demand elasticity of public transport. *Ekonomicky Casopis*. 2006, 54(7), 668-684.
- [9]. Gnap J., Konecny V.: Motor vehicle taxation in the Slovak republic and its impacts in the context of fiscal decentralization. *International Scientific Conference: Business Economics and Management*. Elsevier, 2015, 34, 344-351, DOI: 10.1016/S2212-5671(15)01639-1.
- [10]. Gnap J., Konecny V.: The impact of a demographic trend on the demand for scheduled bus transport in the Slovak Republic. *Komunikacie*. 2008, 10(2), 55-59.
- [11]. Gnap J., Konečný V.: Transport policy related to road transport and sustainable development. *Komunikacie*. 2003, 5(1), 52-61.
- [12]. Gnap J., Konecny V., Varjan P.: Research on Relationship between Freight Transport Performance and GDP in Slovakia and EU Countries. *Nase More*. 2018, 65(1), 32-39, DOI: 10.20858/tp.2019.14.3.6.
- [13]. Javorcik B.S.: Does foreign direct investment increase the productivity of domestic firms? In search of spillovers through backward linkages. *American Economic Review*. 2004, 94(3), 605-627.
- [14]. Konecny V., Berezny R., Bartonikova M.: Research on the Impact of Quality on Demand for Bus Transport. 18th International Scientific Conference-Logi 2017. Cedex A: EDP Sciences, 2017, 134, DOI: 10.1051/mateconf/201713400024.
- [15]. Konecny V., Gnap J., Simkova I.: Impact Of Fiscal Decentralization On Motor Vehicle Taxation In The Slovak Republic. *Transport and Telecommunication Journal*. 2016, 17(1), 28-39, DOI: 10.1515/ttj-2016-0004.
- [16]. Konecny V., Petro F.: Calculation of Selected Emissions from Transport Services in Road Public Transport. 18th International Scientific Conference-Logi 2017. Cedex A: EDP Sciences. 2017, 134, DOI: 10.1051/mateconf/201713400026.
- [17]. Konečný V., Berezny R., Kostolna M., Saradin P.: Comparative Analysis of the Importance of the Requirements of Passengers and Evaluating the Quality of Air and Bus Transport. *MATEC Web of Conferences*. 2018, 236, DOI: 10.1051/mateconf/201823602006.
- [18]. Malmberg A., Maskell P.: The elusive concept of localization economies: towards a knowledge-based theory of spatial clustering. *Environment and Planning*. 2002, 34(3), 429-449, DOI: 10.1068/a3457.
- [19]. Petro F., Konecny V.: Calculation of emissions from transport services and their use for the internalisation of external costs in road transport. 12th International Scientific Conference of Young Scientists on Sustainable, Modern and Safe Transport. Amsterdam: Elsevier Science, 2017, 192, 677-682, DOI: 10.1016/j.proeng.2017.06.117.
- [20]. Poliak M.: Impact Of Road Network Charging System On Pricing For General Cargo Transportation. *Promet-Traffic & Transportation*. 2012, 24(1), 25-33, DOI: 10.7307/ptt.v24i1.263.
- [21]. Poliak M.: The Relationship with Reasonable Profit and Risk in Public Passenger Transport in the Slovakia. *Ekonomicky Casopis*. 2013, 61(2), 206-220.
- [22]. Poliak M., Hammer J., Reuter N., Poliakova A., et al.: The impact of the transport route on the cost of the transfer. *Edtion ed. New York*, 2018. ISBN 978-1-5386-4578-9.

- [23]. Poliak M., Konecny V.: Factors Determining the Electronic Tolling Scope of Road Network. *Ekonomicky Casopis*. 2008, 56(7), 712-731.
- [24]. Poliak M., Poliakova A.: Relation of Social Legislation in Road Transport on Driver's Work Quality. *Tools of Transport Telematics*. Berlin: Springer-Verlag Berlin, 2015, 531, 300-310, DOI: 10.1007/978-3-319-24577-5_30.
- [25]. Poliak M., Semanova S., Mrnikova M., Komackova L., et al.: Financing Public Transport Services From Public Funds. *Transport Problems*. 2017, 12(4), 61-72, DOI: 10.20858/tp.2017.12.4.6.
- [26]. Poliak M., Semanova S., Poliakova A.: Risk Allocation In Transport Public Service Contracts. *Ekonomski Pregled*. 2015, 66(4), 384-403.
- [27]. Poliak M., Simurkova P.: Harmonization of Market Conditions in Provision of Freight Forwarding. 18th International Scientific Conference-Logi 2017. Cedex A: EDP Sciences, 2017, 134, DOI: 10.1051/mateconf/201713400048.
- [28]. Poliak M., Križanová A., Semanová Š., Štefániková L.: The impact of procurement method of the transport services to the financial requirement of performance contracting entity. *Transport Problems*. 2013, 8(4), 67-76.
- [29]. Poliak M., Križanová A., Semanová Š., Štefániková L.: The influence of contract form choice of the transport services ensuring on performance contracting entity requirement. *Transport Problems*. 2014, 9(4), 153-161.
- [30]. Poliak M., Semanova S., Hernandez S., Pastuszkova E.: Impact of road infrastructure pricing on transport planning. *Communications - Scientific Letters of the University of Zilina*. 2015, 17(2), 92-97.
- [31]. Rievaj V., Synak F.: Does Electric Car Produce Emissions? *Scientific Journal of Silesian University of Technology-Series Transport*. 2017, 94, 187-197, DOI: 10.20858/sjsutst.2017.94.17.
- [32]. Rievaj V., Vrabel J., Synak F., Bartuska L.: The Effects Of Vehicle Load On Driving Characteristics. *Advances in Science and Technology-Research Journal*. 2018, 12(1), 142-149, DOI: 10.12913/22998624/80896.
- [33]. Rievaj V., Sulgan M., Liscak S.: Vehicle's technical condition and emission. *Eksplatacja i Niezawodność*. 2008, 1, 61-63.