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DEVELOPMENT OF THE CARSHARING SYSTEM AS AN EXAMPLE SHARING ECONOMY

ROZWÓJ SYSTEMU CARSHARING JAKO PRZYKŁAD EKONOMII WSPÓLDZIELENIA

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ABSTRACT: Nowadays sharing economy is strongly expanding in many areas of life. It plays a significant role in the city structure in the context of city logistics, tools like carsharing, bikesharing or scootersharing. The development of technology is conducive to the growth of this idea. The aim of the article is to present the carsharing system and its significance in the area of city logistics in the context of sharing economy on the example of Polish cities. An evaluation of this system has been carried out with regard to the positive and negative effects of development. In addition, a detailed description was made based on the carsharing system in Poland (in comparison with the solutions used across the world).

KEY WORDS: city logistics, carsharing, sharing economy

ABSTRAKT: Współcześnie ekonomia współdzielenia prężnie rozwija się w wielu dziedzinach życia. Duże znaczenie odgrywa w strukturze miasta w zakresie rozwiązań jego logistyki, między innymi carsharing, bikeshiring czy scootersharing. Rozwój technologii sprzyja wzrostowi tej idei. Celem artykułu jest przedstawienie systemu carsharing oraz jego znaczenia w obszarze logistyki miasta w kontekście ekonomii współdzielenia na przykładzie polskich miast. Przeprowadzono ocenę niniejszego systemu w odniesieniu do pozytywnych, jak i negatywnych skutków rozwoju. Ponadto dokonano dokładnej charakterystyki na podstawie systemu carsharing w Polsce.

SŁOWA KLUCZOWE: logistyka miejska, carsharing, ekonomia współdzielenia

Introduction

The ongoing globalization processes and the increase in the population numbers are prerequisites for the development of cities which can be seen as places of economic, social and political life nowadays. In addition to the functions implemented in the city (such as industrial, commercial, service, transport, cultural, scientific, educational, medical, tourist or administrative), new ones are emerging and should be taken into

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consideration. Urban areas are subject to the phenomenon of urban sprawl, that is the spill-over, absorption of suburban areas, or upstream effects, which can be described as time losses resulting from the fragmentation of urban areas or the use of urban space for the needs of transport infrastructure). As a consequence, urban areas may be seen as expanding areas that need to be managed.

The successive and continuous development of cities is associated with the emergence of various problems that condition their functioning. The concentration of industry, trade and services in a relatively small area may cause limitations, among others, overloading of the existing technical infrastructure, including mainly transport infrastructure. This is an extreme challenge to the city authorities. The excessive congestion in cities and, consequently, the negative effects which it causes, pose another serious problem which needs tackling. Furthermore, that can also be seen as a situation, in which the urban logistics approach is necessary as it provides a wide range of useful solutions to travelling around the city, both in the context of the flow of people and moving loads within the urban area. Solutions in the field of passenger transport are designed to improve movement of people, and new approaches related to the transportation of goods are invented in order to help in the optimization of the flow of goods to and from the area of the city. Examples of infrastructural and organizational measures introduced as part of streamlining of personal flows include solutions such as: Park & Ride, Bike & Ride, Kiss & Ride, passenger hubs, carpooling, carsharing (which will be discussed in detail later in this article) and telebuses. Tools that are introduced as part of the commodity flows are, e.g.: urban logistics centres and the implementation of the last mile solution, night-time deliveries, freight tram, and the construction of ring roads around the city (downtown, urban and non-urban).

City logistics in the context of sharing economy tends to be fairly popular with researchers. For example, in Poland relevant analyses were provided by S. Kauf (2018: 141-151), J. Szołtysek (2016: 2-9; 2019: 2-8), M. Szymczak (2018: 25-38). The present article discusses the use of sharing economy in the context of urban logistics, especially in the context of carsharing. The assessment of this system has been carried out in relation to the positive and negative effects of its development. In addition, the carsharing system in Poland is accurately characterized and compared with other, global, uses of this solution. Finally, the development of carsharing is presented using the example of selected Polish cities.

The economics of sharing – the idea, principles and types

The development of digital economy is fostered by social transformations in respect of recognized and socially accepted values, especially regarding the Y generation, for which the access to goods and services is of greater importance than the concept of ownership itself. The development of modern technologies has facilitated the creation of new forms of the market, e.g. micro-services and micropayments. Sharing economy is an original idea that blends into the process of servicing the economy. It can be seen

as a business, organizational and technological innovation. In the simplest words, it is a new way of doing business, which is based on the use of digital technologies in order to organize market exchange. The condition for running sharing economy is not ownership of resources, but access to them. Still, the concept of sharing economy cannot be viewed in terms of moving away from the market economy, but only as a way to supplement or enrich its functioning (Pietrewicz, Sobiecki 2016: 12-13).

The definitions of sharing economy, collaborative economy or peer-to-peer economy have many features in common, although they do not mean exactly the same and should not be used interchangeably. The article refers to the concept of sharing economy, which is understood as a social and economic phenomenon based on a fundamental change of organizational and distribution models moving towards dispersed networks of interconnected individuals and communities, covering both the direct provision of services by people, sharing, co-creation or co-buying, allowing a radical increase in the efficiency of use of resources (Eckhardt et al., 2019: 5-7 and Schor 2014: 2-5).

The idea of sharing economy is not a new one. In the 1970s, Spaeth and Felson described it as a kind of consumption involving its participants in joint initiatives (Felson, Spaeth 1978: 614). Nowadays, the concept is increasingly often discussed, the main reason being the development of various types of undertakings that can be considered in this context. The premise for initiating this idea was the incomplete use of resources, often significantly dispersed, the sharing and use of which may be beneficial to all of the interested parties.

Sharing economy includes three categories of participants (Pietrewicz, Sobiecki 2016: 13):

- service providers, who share assets, resources, time and skills;
- users;
- brokers, who combine the activities of online service providers' platforms with users.

Activities within the sharing economy can be witnessed in various industries, such as: transport, logistics, real estate (free housing and office space) or home and technical services. The following are mentioned as examples of growth of sectors that include: clothing, food, tools, audio, video and some of the financial services (Szymczak 2018: 30-35). In the context of sharing economy, one should also mention shared mobility, defined as an innovative transport strategy that enables users to have short-term access to various means of transport, e.g. cars or bicycles (Gansky 2010: 27, 48). Shared mobility includes various models of services and means of transport. Examples include: ride sourcing, carsharing, ridesharing (carpooling and vanpooling), microtransit, courier network services, bikesharing or scootersharing.

Carsharing system as a city logistics solution

Worsening quality of customer service, environment and congestion in the city centre gave rise to the development of city logistics (Szołtysek 2016: 44-54). Nowadays

wrong use of the road infrastructure is the biggest problem in the city, e.g. low passenger car filling or too high load capacity of trucks. Therefore the range of activity of city logistics covers the following: process of planning, implementing and controlling flows outside, into the city, through the city and information related to these flows (Tundys 2013: 78).

In many cities in the world, urban logistics plays a crucial role, because it provides solutions to reducing congestion (Kiba-Janiak 2012: 42). As a part of city logistics one can list instruments which improve functioning of urban flows, for example: Park & Ride, Bike & Ride, Kiss & Ride, intermodal hub carpooling, carsharing (which is the main topic in this article) – flows of people, logistics centre, freight tram – flows of freight and telematics, congestion charges. Services which can be shared in city logistics is carsharing, bikesharing, scootersharing. Carsharing was the first implemented solution of this kind (that is why it is the area of interest of this paper), later followed by the others.

The rational use of vehicles allows optimization and a more efficient use of them. Solutions that contribute to this include, among others, traffic facilitation for cars with a large filling,¹ carpooling² or carsharing (Szymczak 2008: 161). Carsharing is a system of joint use of cars provided by transport fleet operators, such as enterprises, public agencies, cooperatives, associations or private individuals. Cars are available for a fee, in most cases, for short periods of time for people who use them occasionally. It should be noted that carsharing is a good solution for people who mainly travel around the city and do not cover more than 10-12 thousand kilometers a year.

This system appeared in the 1950s in Zurich, Switzerland. In the 1970s, the first carsharing projects were launched (Szymczak 2008: 164-165), among others, in France and the Netherlands. North America introduced carsharing (and bikesharing) for the first time in 1994 (Shaheen 2018: 1). The dynamic development of this system started in the 1990s. In 2000, the car sharing system was used by nearly 70,000 people in 350 European cities, and since 2006 these numbers have been gradually growing.

The main focus of the system is to increase the intensity of use of vehicles during the day, which should result in inhibiting the growth of the number of privately registered cars. This system fits perfectly into the structure of a modern city, offering an alternative when choosing a means of transport to move around the city. The idea of the system is to provide more space in the area of the city. The main advantages for the user of a perfectly functioning carsharing system are:

- easy access to vehicles (most often the carsharing spots are located near public transport stops),

¹ Facilitation for vehicles with a large filling is creating dedicated lanes for them on a permanent, periodical bases, or during peak hours. This solution is popular in Canada under the name “transit lines” or the United States known as “high occupancy vehicles” (Szymczak 2008: 161-162).

² Carpooling is about making a free space available in your car for another road user, quite a popular way of moving not only around the city, but also over greater distances.

- no costs related to the operation of the vehicle, e.g.: seasonal tire replacement, insurance fee, fuel cost;
- the possibility of renting an adequate type of car, depending on individual preferences and needs, e.g.: a compact city car or a spacious, family estate,
 - low rental fees of the car if used for a short time,
 - access to top-class cars, which is convenient, economical and environmentally friendly.

What is more, one can clearly show advantages of a well-functioning carsharing system for the city, which include the following:

- positive impact on the environment,
- limited number of parking spaces (better use of public spaces),
- in the future – reduction of congestion in the city.

On the other hand, the main disadvantages for the user and the economy with regard to the carsharing system could be as follows:

- less convenient than having a private car,
- in the event of heavy traffic the costs incurred are higher,
- necessity of having a smartphone with the relevant application,
- intensifying crisis in the automotive industry caused by less interest in buying new vehicles.

Carsharing is often confused with traditional vehicle rentals (which are now also introducing certain elements of carsharing systems as part of their services), and there are several differences between them. Carsharing differs from traditional car rental companies due to the fact that it is not limited by a car rental office and thus the booking, picking up or returning the car. Vehicles are usually rented for an adequate number of minutes, the insurance is included in the cost of renting and the fuel is often included in the overall price.

The idea of carsharing is connected with the ecological awareness of its users. The users of rented cars are permitted to use bus lanes and are exempt from the necessity of paying the parking fees. However, if the car is electric, it can only enter the city centre (if it is not forbidden to do so due to the introduction of an ecological zone in the area of the city centre), which causes some limitations. According to the Transportation Sustainability Research Center, which analysed the German company operating under the carsharing system car2go, one car available in the carsharing system can replace 7–11 private cars.³ Some researchers see the values as even higher since, according to S. Shaheen, one car in the carsharing system can replace as many as 9–13 private cars (Shaheen 2018: 2). Furthermore, according to the analysis carried out in Germany, people who use a carsharing system, use cars in a more conscious way and more often move by public transport. (Kauf 2012: 27)

³ Based on the report: Impacts for car2go on vehicle ownership, modal shift, vehicle miles, North American Cities (http://innovativemobility.org/wp-content/uploads/2016/07/Impactsofcar2go_FiveCities_2016.pdf, access: 15.03.2018).

A great facilitation for this system users is the way of booking cars and the method of their collection, which takes place without the participation of any employee of the company providing the car, thanks to which the system is available 24 hours per day and 7 days a week. Reservations can be made on-line, usually using the mobile application. Moreover, when booking a car in advance, there is a greater chance for the vehicle to be available. Importantly, if you cancel your booking, some operators charge a fee.

In recent years, a very similar solution emerged as part of the carsharing concept, that is 'peer-to-peer' (or person-to-person), which involves renting private cars to other people for a short period of time for a fee. There are tangible benefits for both the car owner and the temporal tenant: the latter does not incur car insurance fees, while the former gets profits on the rental. This solution operates, among others, in Great Britain known as the easy car club.

Carsharing system in the world and in Europe

The carsharing system is gradually developing all over the world. This is reflected by the statistical data presented in Figure 1. An increase was recorded both in the number of people using the carsharing system and the number of cars available in it. The growing popularity of the system contributes to its development over the years. What is more, it gives assumptions to conduct research on the importance and growth of the system.

The detailed description of the data presented in Table 1 shows the basic structure of the carsharing system in the capitals of European cities. The presented classification ranks cities from the most to the least advanced. A price and quantity differentiation

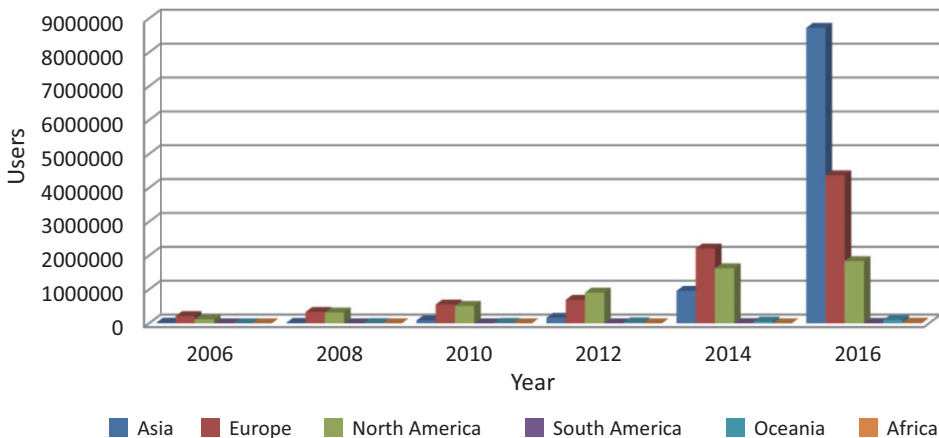


Fig. 1. The number of users in the carsharing system in the world in 2006-2016

Source: own study based on: Shaheen S., Cohen A., Jaffee M., *Innovative Mobility: Carsharing Outlook* (<https://escholarship.org/uc/item/49j961wb>, access: 10.12.2018).

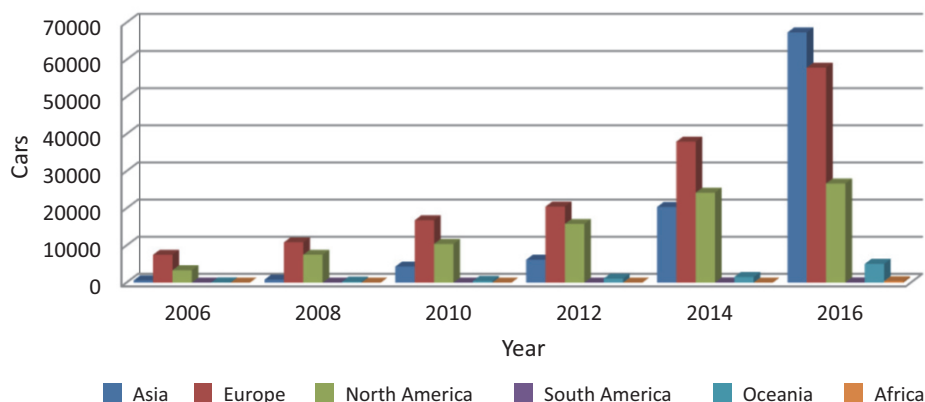


Fig. 2. The number of cars in the carsharing system in the world in 2006-2016

Source: own study based on: Shaheen S., Cohen A., Jaffee M., Innovative Mobility: Carsharing Outlook (<https://escholarship.org/uc/item/49j961wb>, access: 10.12.2018).

between cities can easily be seen. In the top of the ranking is Paris which is characterized by the highest number of cars per 10,000 inhabitants. Moreover, the price of using carsharing services in Paris is considerably lower than in other cities (with the exception of Bratislava and Luxembourg). It is worth paying attention to Warsaw, the capital city

Table 1

The carsharing system in the capitals of the European Union member states in 2017

No.	City ^a	The number of cars per 10 thousand residents	Average price / 1 hour (PLN) ^b	No.	City ^a	The number of cars per 10 thousand residents	Average price / 1 hour (PLN) ^b
1	Paris	19	25.90	12	Vilnius	3	40.80
2	Viena	7	60.70	13	Prague	2	46.60
3	Copenhagen	10	61.70	14	Madrit	2	61.80
4	Brussels	8	51.40	15	London	2	46.50
5	Berlin	8	70.10	16	Buchareszt	0.1	46.40
6	Bratislava	1	6.20	17	Lisbon	1	63.50
7	Warsaw	5	66.30	18	Ljubljana	1	76.50
8	Budapest	1	30.30	19	Stockholm	3	86.30
9	Rome	5	79.00	20	Helsinki	3	87.50
10	Amsterdam	4	79.00	21	Zagreb	1	90.40
11	Dublin	3	34.00	22	Luxembourg	1	22.50

^a Athens, Riga, Tallinn, Sofia, Valetta, Nicosia – no data available.

^b A registration fee is required for some systems.

Source: <https://www.shopalike.pl/transport-sharing-w-europie>, access: 19.03.2019.

of Poland, where there are 5 cars per 10,000 inhabitants, which ranks the city on the 7th place in the general classification of capitals. However, the price for using the cars available in the carsharing system in Warsaw, which is around PLN 56.06, is higher than the average for all the capitals.

The carsharing system in Poland

Poland is a country where, as in other countries of Europe and the world, carsharing services are available for the citizens to use. Table 2 presents basic information about the system in seven cities and the Silesian agglomeration, including data concerning transport activity in the carsharing system, the year of entry, the existing fleet and unit prices for the services.

Seven carsharing service operators run in Polish cities, of which Traficar is the most popular. There are differences between the prices of services of individual operators. The average price per 1 km is PLN 0.78, per 1 minute – PLN 0.61, and for 1 minute of stop – PLN 0.11. In addition, one should note the diversity among service providers in cities in terms of the drive used in cars: internal combustion, hybrid or electric.

The number of cars per 10,000 inhabitants in Polish cities varies. Poznań is in the lead with around 8.4 cars per 10,000 inhabitants, followed by Warsaw – 5.4, Tri-City – 4,

Table 2

Overview of urban carsharing systems in Polish cities

City/Area	Name	Year of introduction	Fleet (cars)		Price in PLN
			number	type	
Silesian Agglomeration	Traficar	2018	140	internal combustion	0.80 / 1 km 0.50 / 1 min ride 0.10 / 1 min stop
Cracow	Traficar	2016	300	internal combustion	0.80 / 1 km 0.50 / 1 min ride 0.10 / 1 min stop
Lublin	Lubelski Samochód Miejski	2016	25	internal combustion	1.00 / 1 min ride + activation fee
Lodz	Easyshare	2018	50	hybrid	0.80 / 1 km 0.50 / 1 min ride 0.10 / 1 min stop
Poznań ^a	Traficar	2017	150	internal combustion	0.80 / 1 km 0.50 / 1 min ride 0.10 / 1 min stop
	Easyshare	2017	200	hybrid	
	Click2Go	2018	102	hybrid	
Tricity	Traficar	2017	300	internal combustion, hybrid	0.80 / 1 km 0.50 / 1 min ride 0.10 / 1 min stop

Table 2 contd.

City/Area	Name	Year of introduction	Fleet (cars)		Price in PLN
			number	type	
Warsaw	Panek	2018	600	hybrid	0.65 / 1 km 0.50 / 1 min ride 0.10 / 1 min stop
	4Mobility	2017	50	electric hybrid, internal combustion	0.80 / 1 km 0.55 / 1 min ride 0.12 / 1 min stop
	Traficar	2017	300	internal combustion	0.80 / 1 km 0.50 / 1 min ride 0.10 / 1 min stop
Wroclaw ^b	Vozilla	2017	190	electric	1.00 / 1 min ride 0.10 / 1 min stop

^a In Poznań, since 2018 corporate carsharing has been run by 4Mobility. As part of the business, the company has 30 hybrid cars. The prices were set at PLN 0.80 per 1 km, PLN 0.55 per 1 min and PLN 0.12 per 1 min stop.

^b In addition to passenger cars in Wroclaw, 10 van cars are offered as part of the system.

Source: own study based on information provided by enterprises operating within the carsharing system, status for 2018.

Krakow – 3.9, Wroclaw – 3, Silesian Agglomeration – 0.8, and Lodz and Lublin – around 0.7.⁴ It cannot be unambiguously stated that the size of a carsharing system affects its development. Nevertheless, carsharing in Poland is relatively new (it began to develop for the first time in Krakow and Lublin in 2016, later in other cities).

In May 2018, the TrafiCargo system offering vans was launched. The system operates in connection with the IKEA stores, and the prices of the service are the same as for passenger car rentals. In addition, since 2018 in 10 cities in Poland the CityBee carsharing company has been in operation. The idea of the company is to facilitate the transport of goods that are larger in size with the use of delivery vans.

Conclusions

Nowadays the problem of excessive congestion in cities is clearly visible and to a large extent hinders the effective movement of people and loads. In the face of limited resources and, at the same time, unlimited human needs, it is necessary to reduce the scale of the problem by introducing solutions that streamline flows. The remedy for most of the problems is the joint use of goods (which in the present article is understood as the carsharing system), and therefore the behaviour complementary to the concept of sharing economy. Currently, the popularity of this type of activities is growing, which was a prerequisite for considering this issue.

⁴ Calculations based on data collected in Table 2 and data of the Central Statistical Office.

It is anticipated that the significance of the solution described in the article will gradually increase, among others due to the rising awareness of the public as well as the noticeably growing trend of the carsharing system in the world. Likewise, there has been noted a successful development of this system in Poland over the years 2016-2018. Therefore, it is worth drawing good and effective practices regarding this system from European cities as they could be implemented in Polish cities with the aim of improving its operation. A very important aspect is raising the level of knowledge of the existence and acceptance among residents and potential system users. In addition, the openness of city authorities to introducing new solutions and taking into account the needs of all users of urban space are very important.

Evidently, the carsharing system has many advantages for its users, businesses, employers and cities in which they are run. Positive effects for the user include: no necessity of owning and maintaining a car which is available on the rental basis at any time when needed, diversification of the car fleet, or dividing fixed costs of car maintenance between many users. Carsharing is also a viable alternative to company cars. Finally, we should list benefits to the city and, at the same time, all its users. Here, the most important advantages are: more efficient use of urban space, limitation of parking difficulties, increase in the importance of travelling by public transport, cycling or on foot, and finally – reduction of pollution in the city.

It is true that the system is not flawless as there can occur major failures in its operating or the growing increase in the importance of carsharing can contribute to reducing the demand for privately purchased cars, which – in turn – can translate into some economic slumps in the automotive industry. Lastly, the carsharing system is based on the ability to use new technology, hence one could wonder whether access to it is equal for everyone. It seems that the accessibility of it is definitely a lot easier for the younger than for older people.

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