

Sharing Systems in Urban Mobility

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Abstract. *In the modern world, there is no ordinary day without some kind of sharing, which can be material and immaterial. The topic of the paper is sharing economy in the field of urban mobility. The first part contains an introduction to sharing systems. Then follows sharing of types in urban mobility. This section describes the sharing hierarchy and four existing models in general. In the hierarchy, there are three major groups. First is sharing of a vehicle, then sharing of a passenger ride and the last group is sharing of a delivery ride. The models show the functioning of the systems independent of the type of vehicle. In a more detailed description of the mentioned categories and models, the advantages as well as disadvantages of the same are listed. Finally, examples of shared systems in the Republic of Serbia are given.*

Keywords. *Sharing economy, transportation systems, shared urban mobility*

1 Introduction

The sharing economy has been present in a large number of different spheres in our lives for years. The question is, what are reasons and why did this form of sharing occur? After the last world economic crisis, the principles of sharing are used more and more. The mentioned principles are based on business that goods can be used more than once and that single-use things are eliminated as much as possible. These procedures are not only good from an economic point of view, but also protect the environment (Ciari, 2012). The roles and perspectives of users, companies and municipal authorities in the institutionalization of the sharing economy in different geographic contexts have very often been the subject of previous research. This contributed to defining the main characteristics of the sharing economy, such stakeholders, the advantages, the disadvantages and various challenges during the implementation of the concept. From the user's perspective, research on motivation is particularly useful, with an emphasis on perceived benefits reflected in cost savings. An essential observation from a business standpoint is that the sharing economy is not inherently sustainable (Mont, 2020). It is evident that the urban governance perspective on the sharing economy differs across geographical contexts. These variances are mainly influenced by the sustainability challenges encountered by different cities and the objectives they aim to achieve (Reddick, 2020; Yang, 2020).

The increasing congestion in cities is caused by the small number of occupied vehicles, i.e. most often there is only the driver in the car without any other passengers. Furthermore, in almost all major cities there is a lack of free parking spaces, low vehicle speeds, increased stress and nervousness in traffic. Then the big expenses related to a private car. The main characteristic of shared mobility is that instead of private vehicle, use vehicle that is intended for shared use. With the advent of smartphones, and thus applications, sharing in urban mobility is becoming more and more simple and comes to the fore.

2 Sharing Types in Urban Mobility

2.1 Categories of Shared Mobility

Shared mobility can be defined as subgroup of sharing economy and allows users to use the type of transport they need, mostly for the short term. The following figure shows the mobility sharing hierarchy and includes a wide range of sharing in the field of traffic.

As can be seen on the mobility sharing hierarchy (Figure 1), there are three major groups. First is sharing of a vehicle, then sharing of a passenger ride and the last group is sharing of a delivery ride. The carsharing system has the following characteristics: it can reduce the ownership and/or use of private cars, and it can reduce the kilometers driven. In addition to above, one of the biggest benefits is that it can reduce the demand for parking spaces in cities (Mouratidis, Peters, van Wee, 2021). More about this system is given below.



Figure 1. Hierarchy of shared mobility (Source: Shaheen, Bansal, Chan, Cohen. Mobility and the Sharing Economy, 2016)

E-scooter sharing emerged as the last subset of vehicle sharing. The mass appearance of micromobiles dates back to 2017. Among the first cities for sharing e-scooters are Barcelona and Milan in Europe, while in the United States the city of San Francisco and Columbia (Shaheen, Bansal, Chan, Cohen, 2016). Today, almost all major cities of the world have this type of sharing. There are two types of e-scooter sharing. The first system operates on station principle. The e-scooter must be returned to the official station that is intended for parking the same. The second system is free-floating and this kind of system is more popular in the cities. In the last period, more and more employees use e-scooters to make work trips, as well as students to go to universities. E-scooters are replacing trips by cars and public transport.

With the help of bike sharing system, it is possible to increase the percentage of bicycles in the daily trips, and in addition, it can replace the use of public transport or a passenger car. Among the biggest contributions are the increases in physical activity levels as well as travel time savings to the users (Teixeira, 2021). The big advantage of this form of sharing is also that it can reduce congestion in cities and reduce traffic density on roads (Mouratidis, Peters, van Wee, 2021). In recent years, station-less bike sharing programs have been launched worldwide, serving as significant representatives of the sharing economy (Yang, 2020). The rapid development of digital technology has impacted bike sharing systems as well, leading to the emergence of numerous digital platforms in recent times. These platforms have become the driving force behind the expansion of the sharing economy, reshaping organizational growth strategies, control concepts, and inter-organizational relations (Li, 2023).

The second large group in the hierarchy is sharing of a passenger ride, which consists ridesharing, on-demand ride services and microtransit. Ridesharing is based on sharing a ride among those people who have common place of departure and final destination. This sharing group is further broken down into carpooling and vanpooling. The last subgroup includes vans with up to 15 seats. The subgroup on-demand ride services can be treated as the opposite of classic ridesharing. In this case, the emphasis is not on the driver, who offers a ride, but on the passenger, who is looking for a ride. This includes the following categories: ridesourcing, ridesplitting and e-hall (Shaheen, Bansal, Chan, Cohen, 2016). Ridesourcing can be defined as a service similar to taxi service. One of the biggest disadvantages of this type of sharing is that sustainable mobility in cities can be undermined due to the service on personal demand at significantly lower costs than taxis or public transport. The positive side of ridesourcing is that it reduces the demand for parking spaces (Mouratidis, Peters, van Wee, 2021). It is impossible to realize the mentioned trips without mobile applications. Ridesplitting is a newer form of ridesourcing, where the emphasis is on sharing the ride and sharing the cost of trip among those who have similar routes. Companies are in charge of such services. Many of these systems recommend that passengers gather at precisely designated intersections. E-hall is at the last place in this group, which actually means a taxi service in the modern exit. Instead of calling a taxi service with a classic phone call, users order taxis through mobile applications. In recent years, along with this change, taxi driving has increased. The third form of sharing of a passenger ride is microtransit, which involves flexible routing, scheduling or both. There are two categories within microtransit: fixed route, fixed schedule and flexible route with on-demand scheduling. Private companies, but often also public transport agencies mostly operate these services. Sharing of a delivery ride stands out as a special group. The service is often referred to under another name, which is flexible delivery of goods. Couriers connect via the platform with the freight. It is typical for couriers to use their own automobiles, bicycles and e-scooters. Today there are two types of business: a) peer-to-peer delivery services and b) paired on-demand passenger ride and couriers services (Shaheen, Bansal, Chan, Cohen, 2016).

2.2. Shared mobility models

In recent years, four models have been established for aforementioned categories in the sharing hierarchy (Figure 2). The models show the functioning of the systems independent of the type of vehicle. The first model called peer-to peer or car rental. Car owners can give their vehicles when they are not in use to other people. Between the owner and the user stands a broker who monitors supply and demand and is available to both parties. Today, the online platform is more and more common, but the broker still monitors the user's payments. The broker works on a percentage of the income. The most famous system of this model is „Turo“ (Shaheen, Bansal, Chan, Cohen, 2016).

The following model is often referred to as a modern car club. The history of this model dates back to 1987 and Switzerland, when the first classic car club was founded. Cars are owned by a provider, which may be parked at authorised parking space or may be free-floating. Clients mostly rent vehicles for short-term purposes and for one way-trips. Access to the cars is made possible through mobile applications. „Zipcar“ is one of the leading systems of this model (Santos, 2018). Systems for bicycles and e-scooters also work in this way.

The third model is the equivalent of the Uber system. Providers do not have their own fleet of cars, but they register individuals for drivers who own cars. Companies as well as brokers in Model 1 are present to track payments. This system is very similar to taxi services. The question is often asked to what extent this system affects and destroys the taxi market. Next to the Uber, Lyft is the second most famous system of this kind of model.

The latest model includes cars, vans and buses. When passengers travel long distances, it means they are making long-distance trips. Through the application, the client can enter the starting place and the final destination, as well as the date of departure. In this way, the user can find the vehicle and the driver who will make a trip. This also applies in the reverse case when the driver offers seats in the vehicle. The most successful systems of this model are BlaBlaCar, UberPool and LyftLine (Santos, 2018). This model can work based on the following principles: acquaintance-based, organization-based and ad hoc (Chan, Sheeren, 2012). Some of the advantages of this model are increase in the mobility of workers with lower incomes and the increase in the average number of vehicles occupied (Mouratidis, Peters, van Wee, 2021).

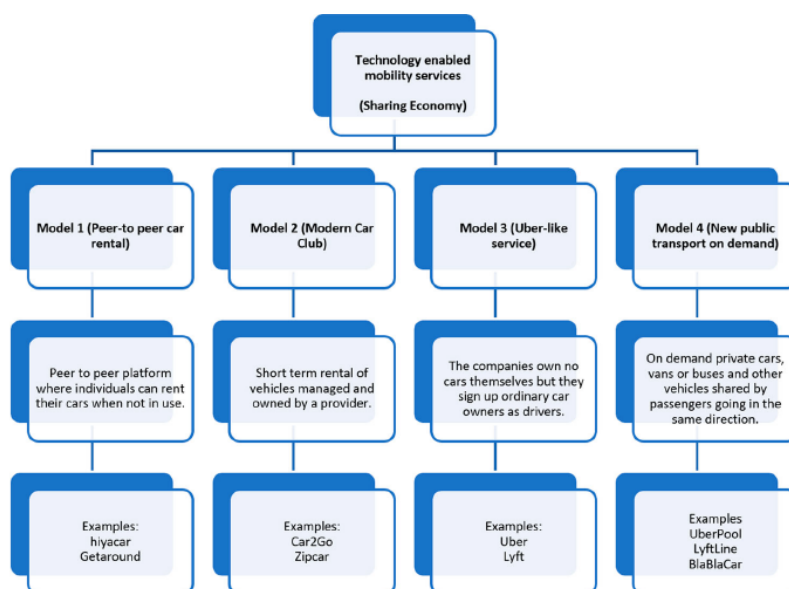


Figure 2. Shared mobility models (Source: Santos. Sustainable and Shared Mobility Models, 2018)

In practice, it's often observed that companies' institutional strategies for sharing economy concept vary from one city to another. They usually have similar launch strategies but use different institutional approaches as they address diverse spatial conditions. These conditions include local institutions (such as rules, norms, and cultures), specific physical elements of the place (such as infrastructure and urban mobility challenges), and issues of power (such as support and resistance) (Waes, 2020).

3 Sharing Systems in the Republic of Serbia

In the following section of the paper, several examples of sharing systems that operate in the territory of the Republic of Serbia are listed.

As in the world, as well as in the Republic of Serbia, the most famous carpooling system is BlaBlaCar. The most popular shared routes using the BlaBlaCar application in the territory of Serbia is realized on the following distances: Novi Sad – Belgrade, Niš – Belgrade, as well as Subotica – Novi Sad. Transportation can also be shared outside the country. Thus, based on the official data of the BlaBlaCar website, a large number of transport demand is registered on the following international routes: Belgrade – Zagreb, Belgrade – Ljubljana, Belgrade – Vienna and Novi Sad – Ljubljana. Through BlaBlaCar people can find and offer a trip. How does the BlaBlaCar work? If a person wants to travel from point A to point B, it is necessary to enter the place of departure and where the passenger wants to travel, as well as the time via the official website or mobile application. Then the person needs to make a reservation. With the reservation, the potential passenger receives the number of the driver with whom the person gets in touch and can find out more details about the trip. During or immediately after the completion of the trip, the passenger is obliged to pay the pre-agreed amount of the transportation as well as the rating of the driver via mobile application or website. In the opposite situation, when the driver offers trip via the mobile application or website, the procedure is the follow. The task of the driver is to indicate the starting and ending point of the trip. In addition, the date and time of departure should be specified (www.blablacar.rs).

The company "Twety" has e-scooters of the latest generation, which can develop a maximum speed of 25 km/h. The mentioned company currently operates in two cities in Serbia, namely Belgrade and Novi Sad. The rental of e-scooters is done through the application "Twety Scooter". It is necessary to scan the QR code or Matrix code at the beginning of the ride, as well as at the very end in order to charge for the ride. The bankcard must be connected to the application. The application also shows the location of the e-scooter that is ready to drive. (www.twety.app).

The city of Novi Sad has a system for renting public bicycles called "NS bike". There are 16 stations within the system where the bike can be rented at any time during the 24 hours of the rental season

(www.parkingns.rs/bicikl). Bike sharing systems can also be used for tourist purposes in cities. Examples of such cities are follows: Senta, Belgrade, Palić and Vrnjačka Banja.

4 Conclusion

Each of the systems mentioned in this paper contribute to great savings for the individual, and the most of them for society and the environment. Some of the examples are: electric and hybrid vehicles can be used in the carsharing system. Bike sharing and e-scooter sharing contribute the most to maintaining the environment and improving human health. Considering that, one vehicle is used by several users, this leads to a smaller number of private cars, fewer parts that are changed during service, which also causes less waste. When it comes to society, it can be pointed out that carpooling and ridesourcing enables the realization of trips even for those people who have low incomes or do not have a good connection with public transport.

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