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A BICYCLE AS A COMPLEMENTARY ELEMENT OF URBAN LOGISTICS

Abstract

The fact that public transport, with particular regard to the urban logistics, experiences difficulties in numerous Polish cities indicate there is a need to refine a transport network using an alternative mean of transport which is a bicycle. It is necessary to limit usage of traditional means of transport in favour of solutions generating zero emission of exhaust fumes. One such solution is bike & ride + bicycle & bike system. It was introduced in Bydgoszcz and now the bicycle is a complementary element of urban logistics.

Keywords: a bicycle, public transport, ecology, logistics

Introduction

One of the major problems, which modern towns need to face, is heavy traffic and hundreds of cars blocking the streets. Traffic capacity of the available road infrastructure hinders the number of vehicles which leads to congestion on the roads. In consequence, the smog, caused by large numbers of cars stuck in traffic jams, appears to be another problem. Therefore, the construction of modern transfer points where bicycles rental is possible seems to be a reasonable solution. There is a good chance that an increase in the awareness of people who use such mean of transport could contribute to the limit of exhaust fumes and positively affect the air people breathe in Poland. The presented study aims to present both issues concerning using bicycles as the alternative mean of city transport, as well as implementing necessary innovations at the level of Polish provincial cities. The following informations have been collected by the author as a single-case study, which should prompt the reader to reflect on his or her everyday surroundings.

1. Changes in public transport functioning in a city

The heavy traffic cannot be handled by the city roads anymore. It is one of the greatest challenges which people managing urban infrastructure have to deal with. The strongest congestion¹ is observed in highly urbanised areas and, especially, during the, so called, peak traffic – between 7 a.m. and 9 a.m. which is the time when people commute to work. The consecutive rush hours take place between 4 p.m. and 6 p.m. when people return to their homes. The most frequent reason why congestion happens is an enormous increase in the number of cars used by individuals. Moreover, people tend to move to the outskirts, what, in consequence, leads to the high extension of the city areas. The society is becoming lazy and, because of long hours usually spent at work, people do not always have time to do some shopping (Stangel, 2013). In order to deal with that problem, they use all the available services offered them by the supermarket chains, such as a home-delivery service. The number of operations carried by delivery vehicles is so great that, regularly, it is impossible to find a free parking space in residential areas. The same can be claimed as far as public transportation is concerned. Finally, the number of single-track vehicles (scooters, motor bicycles, or motorcycles) is growing all the time.

The bicycle rental network is enjoying a huge recognition and it is used by millions of recipients every year. In such a situation, it seems to be logical to include the bicycle as an alternative mean of transport into the urban logistics network. The bicycle rental points, which are created all over Poland, have numerous supporters. The registration does not take long and the possibility to use them on the area of the entire city gives the users many benefits, like: no need to own a bicycle, no money necessary to buy or service one, as well as no risk of theft. In Bydgoszcz, there are 37 bicycle rental points where one can rent one of 15 available bicycles. At rational using the time given, it is achievable to travel across the city without any extra fees. The rental points are located in such a way that 20 minutes is just enough time to cover the distance from one station to the other (Guzman, 2010)². When cyclists are tired, they can always use public transport network which includes modern buses and trams connected in a way that it is possible to change the vehicle without any problems. Additionally, on the Brda River, there are also water trams available.

Among the most common systems of commuting involving bicycles, the following ones can be distinguished:

- bike & ride – a combination of a bicycle travel with public transport; commuting to work, school, for shopping, and the like;
- ride & bike – a travel starts with getting to a bicycle rental point by public transport and then continues by bicycle;

¹ Congestion is an increase in the number of vehicles on roads and the traffic intensity. It is the, so called, “road paralysis”, caused by blocking certain parts of roads. In transportation, it is connected with the increase in the number of cars at certain periods of time. In the transport of cargo, the congestion is the most frequently observed in the case of seasonal freights. Source: (www 1).

² See also how the bike-renting systems looks like in other countries.

- bike & ride + bicycle & bike – a travel from home to the public transport station by bicycle, transporting the bicycle and continuation of the travel by bicycle.

Following the clients' expectations, bicycles adjusted to any situation appeared on the market. Their construction allows the user to quickly travel across the city but, if the need be, it is possible to quickly convert them into a handy suitcase and travel by public transport (Midgley, 2011)³. It has been calculated that the average distance traveled by bike by bike renting places in Bydgoszcz does not exceed 3 km (Pucher, 2008)⁴. In the context of City Logistics, Smart City (Midgley, 2011), Green Logistics taking advantage of the possibilities offered by bicycles seems to be an important issue as far as public transport logistics is concerned (Tundys, 2011).

The data published by Warsaw Public Bike Veturilo shows the changes in the demand for using rented bicycles over a span of several years. As presented in the Table 1, at the beginning of 2013 there were about 1 million rentals, whereas in 2016 their number reached 6 million – it shows the scale of the phenomenon.

Table 1. The level of bicycle rentals in Warsaw 2013–2016

1 million rentals noted by the Veturilo system on 23 rd June 2013
2 million rentals noted by the Veturilo system on 8 th October 2013
2.5 million rentals noted by the Veturilo system on 17 th April 2014
4 million rentals noted by the Veturilo system on 28 th October 2014
5 million rentals noted by the Veturilo system on 23 rd June 2015
6 million rentals noted by the Veturilo system on 29 th April 2016

Source: (www 2)

Bicycle is also a great challenge for the producers of cycling equipment, clothes or additional car equipment. Various roof-racks or carriers installed on towing hooks ensure safe car travelling with bicycles during holiday travels. It also needs to be added that because of the lack of precise data regarding the amount of cycle paths and traveled kilometers in relation to different types of vehicles it is not easily possible to make a comparative analysis.

2. Cyclists safety in regard to the cost of accidents

But for the right road infrastructure, the systems presented above would not be able to provide efficient services to the bicycle users. There are more and more cycling lanes in Polish cities and that allows much safer travelling on the roads. The awareness of the single-track vehicles users is increasing as well and, as a result, there are fewer accidents in which they are involved. However, according to the data published in the cyclists' safety in Poland report of 2016, the cyclists were involved in 4737 accidents. There were 271 casualties (cyclists only) and 4298 injured (4276 were cyclists and 22 car passengers). Compared to the previous year, the number

³ See also what the amount of cycle paths is in other countries.

⁴ See also the average length of the rides in other countries.

of accidents involving cyclists increased by 103 (2.2%) (www 3). The most common reasons of accidents are:

- ignoring the right of way – 615 accidents,
- inappropriate turning – 215 accidents,
- inappropriate speed to the driving conditions – 136 accidents.

According to the report the highest number of people involved in bike accidents are those belonging to the 60+ group who are not always able to properly assess the road conditions. In 2016, they were involved in 479 road accidents. Another group of casualties are children between 7 and 14 years old – there were involved in 286 accidents. The most common reason of accidents with children is the complete lack of knowledge concerning traffic regulations.

Table 2 presents road accidents perpetrators. 6% of them were riding bicycles. They are also responsible for 6% of casualties. However, in accidents with bicycles involved, it is not always the cyclist who is to be blamed. Hence, it is important to constantly inform about possible risks which can be encountered on the road. It is probably best understood by people who travel using both bicycles as well as cars.

Table 2. Road accidents according to the vehicle of the perpetrator

A vehicle of an offender		Accidents	%	Killed	%	Injured	%
A motor car		22 134	76.1	1657	72.5	28 342	78.4
A bicycle		1778	6.1	139	6.1	1703	4.7
A motor bicycle		731	2.5	54	2.4	762	2.1
A motorcycle		823	2.8	132	5.8	801	2.2
A motorcycle with the capacity to 125 cm ³		172	0.6	16	0.7	176	0.5
A bus	public transport	318	1.1	11	0.5	452	1.3
	other	101	0.3	4	0.2	156	0.4
A heavy-loaded truck	gross vehicle weight rating to 3.5 t	1297	4.5	122	5.3	1643	4.5
	gross vehicle weight rating above 3.5 t	904	3.1	108	4.7	1165	3.2
An agricultural tractor		118	0.4	16	0.7	133	0.4
A quad bike		32	0.1	6	0.3	33	0.1
A light quad bike		19	0.1	3	0.1	17	0.0
An emergency vehicle		3	0.0	–	–	8	0.0
A tram, trolleybus		51	0.2	1	0.0	104	0.3
Other vehicle		68	0.2	4	0.2	79	0.2
An unspecified vehicle		532	1.8	11	0.5	576	1.6

Source: (www 3)

Taking into consideration data from the chart above, it can be concluded that it is the result of the huge scale of bicycles popularity. The reasons of accidents mentioned above are just a few of many. In many situations the people involved in the accident failed to think and foresee possible consequences. According to the report the main reason for the majority of accidents and collisions is the lack of the knowledge concerning traffic regulations. When it comes to children at the school age, they have to do various tasks and finish a courses in order to get

a “bicyclist’s licence”. Unfortunately, in case of adults, who want to travel using a bike, only an ID is necessary and having one is in no way a guarantee of skills and knowledge when it comes to travelling on public roads. Every traffic incident involving cyclists is associated with significant costs, often arising to more than a few thousands of zlotys, and emergency services participation. According to the author, the relevant solution to this problem would be introducing obligatory civil liability insurance (OC) for cyclists. The insurance would cover a part of rescue actions and rehabilitation costs.

3. Cyclists and ecology

Travelling by bicycle has become an important element of urban logistics. Persuaded by others to actively participate in the social life, people try to follow the so-called “fashion”. According to the author, it is a very positive fashion as it offers numerous benefits provided that one follows it in a sensible way. It is not enough to buy a good bicycle, fashionable accessories and an app for counting the kilometres ridden on the bike. First and for most it, it is important to realize what the benefits of using a bicycle are. It neither uses fuel nor does it produce exhaust fumes, it takes less space than a car, allows one to burn some calories and makes one feel better. In Picture 1 one can see the author of the article who in 2016 rode 4000 km on his bike, whatever the weather. If one assumed that the average fuel consumption of a average class car is 7 litres per 100 km, it would turn out that the author saved about 1400 PLN.



Figure 1. A bicycle in practice

Source: (Grzegorz Lewandowski’s private records)

All the presented issues make one wonder what the future of bicycles and cyclists might be. Local authorities are aware of the fact that cycling is not only beneficial

for citizens' health but it also contributes to making the roads more passable. This is why in so many places the authorities try to increase the bicycles participation in transport as it may be the solution for the problem of congested roads. Using a bicycle as a daily mean of transport is definitely a healthier and better choice for both the cyclist as well as for the environment. However, the question is whether or not the bicycle has not become a threat for the cities' income connected with the parking fees and public transport tickets. Taking into consideration the data concerning the number of bicycle rentals, not only in Warsaw but also in many other Polish cities, one can agree with such a claim. The author's personal experience can be used as an example. Because of health problems the author was forced to use his car in the period from December till the end of March. The cost of using the car was, on average, 450 PLN a month. Based on this example, it is clear what impact on economy travelling by bicycle has.

Conclusions

A greater access to cycling lanes creates a need for adjusting modern technologies to the existing infrastructure. A connection with the existing public transport, providing rest places with amenities, parking spaces for bicycles or toilets and places where cyclist could have a snack while travelling is of vital importance. Another thing is making other users aware of interdependence on the roads. The streets are not a place where one fights for survival as cyclists are on a lost position in a confrontation with cars. To achieve success, a coordinated system of cycling lanes safe for cyclists, pedestrians and car drivers should be created. The current regulations concerning using cycling lanes by rollerblades and skateboarders should also be analysed. What can also influence the road safety is supporting alternative means of transport and developing an educational program for schools. Bicycle is becoming more and more popular due to its mobility in the urban logistics (Stangel, 2013). The influence of modern technology, business development and an increase of the demand for bicycles usage is one of the elements stimulating the economy. Due to high level of pollution in cities, especially during summer months, it is reasonable to promote using bikes as a main mode of transportation. To make this happen cities should make an effort to expand already existing and create new safe cycle paths.

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