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RESEARCH OF USAGE OF URBAN BIKES STATIONS IN BIELSKO-BIAŁA

Summary: The article presents an analysis of the rentals and returns of bikes to "BBbike" city bike stations located in Bielsko-Biała. This analysis covered the period from April to June 2019 and the same period in 2020, except for the month of April, in which, due to the prevailing state of the pandemic in Poland, the "BBbike" system did not function. Based on the presented analysis, it was found that the largest number of rentals took place in June 2019 and 2020. For users, the most attractive city bike stations are those located near the railway station, shopping centers and schools.

Keywords: city bike, traffic engineering, road transport

BADANIA WYKORZYSTANIA STACJI ROWERÓW MIEJSKICH W BIELSKU-BIAŁEJ

Streszczenie: W artykule przedstawiono analizę wypożyczeń i zwrotów rowerów na stacje rowerów miejskich „BBbike” zlokalizowane w Bielsku-Białej. Analiza ta obejmowała okres od kwietnia do czerwca 2019 oraz ten sam okres w 2020 r. z wyłączeniem miesiąca kwietnia, w którym ze względu na panujący w Polsce stan pandemii system „BBbike” nie funkcjonował. Na podstawie przedstawionej analizy stwierdzono, że największa liczba wypożyczeń miała miejsce w czerwcu 2019 oraz 2020 roku. Dla użytkowników najatrakcyjniejsze stacje rowerów miejskich to te, które znajdują się w pobliżu dworca, centrów handlowych oraz szkół.

Słowa kluczowe: rower miejski, inżynieria ruchu, transport drogowy

1. Introduction

When peoples started to look for alternative means of transport, urban bike stations were created and put into use for interested followers. The bike-sharing system is a self-service public bike rental in cities. It is used in big agglomerations for short-distance shipment. It is promoted in cities for reduction of traffic jams, exhaust

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emissions and improving people's health. It eliminates disadvantages of private bike like exposure to theft and high price of purchase and use [1-3]. Maintenance-free urban bikes systems in different cities in the world and in Poland are more and more developed. Urban bikes have special interest in big and medium size cities. Person who wants to rent a bike is not owner of product but it is buying rights to use bike for its own needs. Person who wants to rent a bike from system is not charged with obligation of maintenance and storage of bike. User is renting bike for specified time for specified price. Urban bikes systems are gaining popularity in last few years also in many cities in Poland. On the Fig. 1. are presented numbers of rentals in chosen cities in Poland in year 2019.

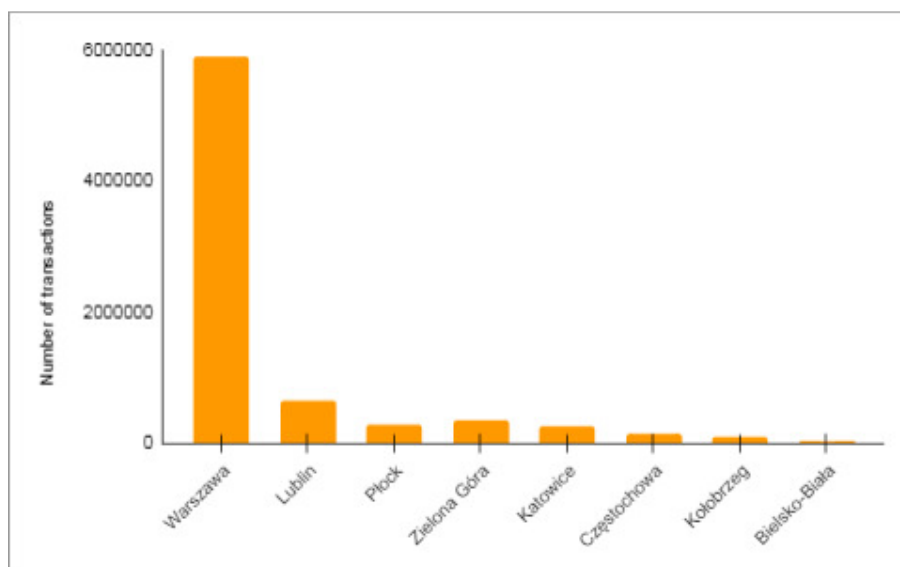


Figure 1. Number of rentals from urban bikes stations in chosen cities in Poland in year 2019

In article is presented number of rentals and returns of urban bikes to „BBbike” stations located in Bielsko-Biała. This analysis covered the period from April to June 2019 year and the same period of time in 2020 except April, when in Poland were pandemic time and „BBbike” system was not working.

2. Bicycle infrastructure

For many reasons, a lot of people are using bikes as a mode of transportation. Bike can be used on the whole distance or just a part of (because user can change mean of transport in the meantime). In peak hours on the streets of Bielsko-Biała traffic is heavy. There is also desire to improve health by spending more time on fresh air. By the increasing interest city authorities decided to introduce urban bikes. Their advantages are: low price for rental and availability practically all over the city. Also operator of urban bikes arranges graphic of stations and bikes to fit the surroundings

and development of places where the stations will be mounted. Important thing is to locate bike stations to allow everyone potential client easily use them. Organizer should take care of safety and connect system to make it functional, ecological, useful and effective. The bicycle infrastructure is constantly developing, what brings expansion of the bicycle fleet and stations for them. Important thing is to proper equip existing bicycle paths with vertical and horizontal signs and make safe points where roads for the cars and bikes are crossing. Update of Regulation of the Minister of Infrastructure in Poland in year 2015 is changing detailed technical conditions for signs and traffic signals. New types of signals for cyclist have been introduced [4]. Lighting signaling has been supplemented with a new type of devices. For standard signaling devices has been added symbol of bike and the lens size was set to 200 mm. The sequence of the transmitted signals remained unchanged from those applicable to road traffic. The following sequence continues: red signal -> red and yellow signal -> green signal -> yellow signal -> red signal. Traffic lights for cyclist are shown in Fig. 2 and Fig. 3.



Fig.2. General Signac for cyclists [5].



Figure 3. Directional signal for cyclists [5]

As reported in August 2020, in the city of Bielsko-Biala, approx. 36.9 km of bicycle paths, pedestrian and bicycle routes and bicycle lanes are available for cyclists [6].

3. Characteristics of the city bike system in Bielsko-Biała

In Bielsko-Biała there is one public city bike rental system “BBbike” It appeared as the first in the Silesian Voivodeship, and its operators were in 2014-2017 - "BikeU", and from 2019 until now - "Homeport Polska". In the first years of operation, the system included 12 stations and 120 bicycles, while after the takeover of city bicycles by the above-mentioned company "Homeport Polska", the system consisted of 24 stations and 190 bicycles (Fig. 4).

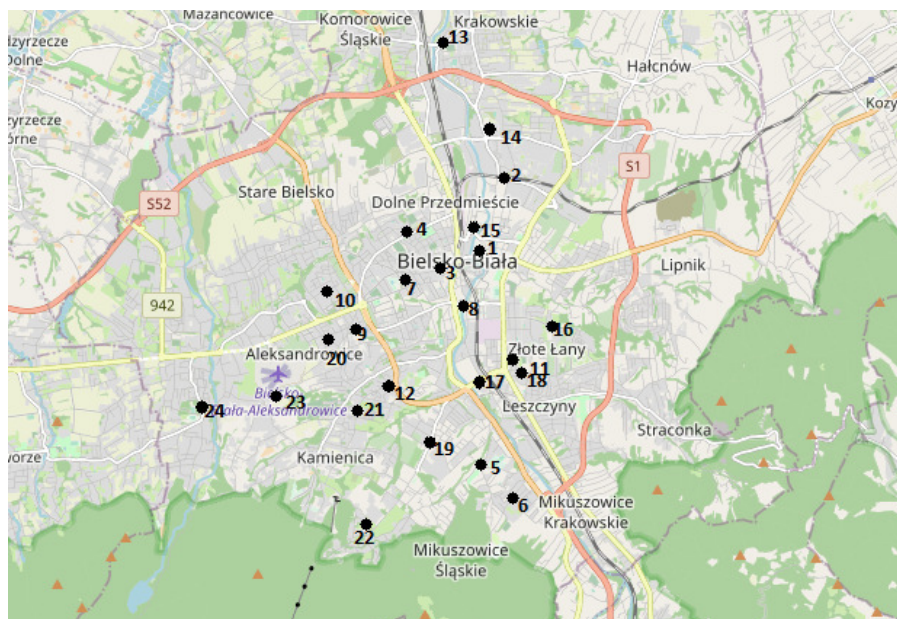


Figure 4. Map of city bike stations in Bielsko-Biała.

Source: Own study based on Open Street Map [9]

At each station there are 10-14 stands with 8-12 bicycles. Each station has 2 places to secure bikes with a security cable. The operator has located the stations so that each potential user has easy access, which is near the center, railway station, universities, bus terminals and recreational areas, and that the user can make a journey from the original station to the nearest station in no more than 20 minutes [7]. Below is a map of the bicycle stations in Bielsko-Biała. Each year, the city bike system operates from March 1 to October 31. A person who wants to rent a bike must have an active account in the operator's system, in which he will have a positive balance on the client's account in the amount not less than PLN 4.00 gross. The two-wheeler can be rented from a selected city bike station. The entire procedure of renting a bike is indicated by messages on the terminal or in the mobile application, which greatly facilitates the rental person. The Lessee is obliged to check the technical condition of the rented bike. The rental time depends on the customer, but the bike must be returned no later than 12 hours after the rental. After completing the ride, the user may place the bike at any station by blocking it in the electric lock. However, if there is no free space, the

user may leave the bike at the station, locking it with a security cable in a designated place on the side of the station. At the time of return, the technical condition of the rented bike cannot be worse than before the rental. The system operator also requires the lessee to always secure the bike against theft and not to make the bike available to third parties. The system manager gave the stations such names as to make it easier for the user to locate them. The table below shows the station names with system numbering.

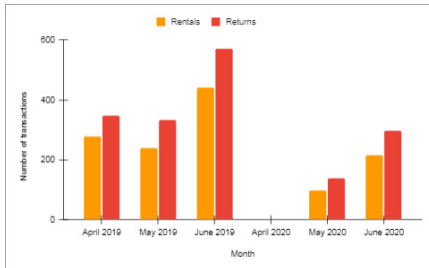
Table 1. Station names with numbering

| Station number | Name of the bike station |
|----------------|----------------------------------|
| 1. | Plac Ratuszowy |
| 2. | Dworzec PKS |
| 3. | Plac Mikołaja |
| 4. | Piastowska (Starostwo Powiatowe) |
| 5. | Cygański Las |
| 6. | ATH |
| 7. | Konopnickiej - Basen |
| 8. | Partyzantów – Plac Mickiewicza |
| 9. | Babiogórska – Pętla |
| 10. | Spółdzielców |
| 11. | Łagodna – Złote Łany |
| 12. | Sosnkowskiego – Basen |
| 13. | Św. J. Chrzyciela |
| 14. | Grażyńskiego/Kwiatkowskiego |
| 15. | Mostowa (SFERA) |
| 16. | Lenartowicza/Jutrzenki |
| 17. | Bora - Komorowskiego (Gemini) |
| 18. | Górska – Bulwary Straceńskie |
| 19. | Boboli – Szpital Wojewódzki |
| 20. | Lotnicza/Szarlotki |
| 21. | Gościnna/Kolista |
| 22. | Karbowa/Armii Krajowej |
| 23. | Zwardońska – Lotnisko |
| 24. | Jaworzańska - Stadion |

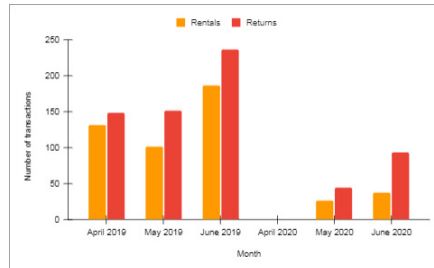
4. Use of bicycle stations In Bielsko-Biała – numbers of rentals and returns

The number of rentals and returns to individual „BBbike” stations in period from April to June 2019 and 2020 is show in Fig. 5.

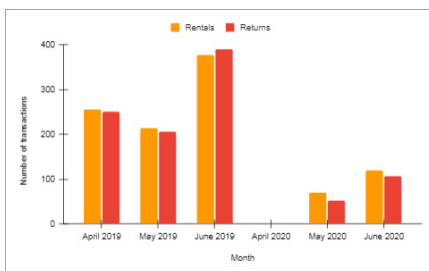
1.Plac Ratuszowy



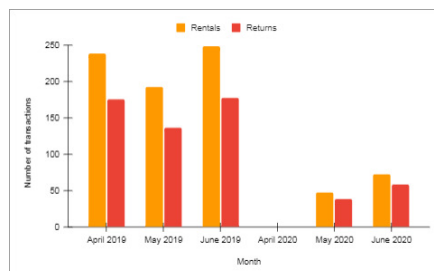
2.Dworzec PKS



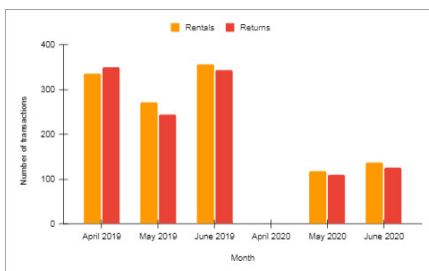
3.Plac Mikołaja



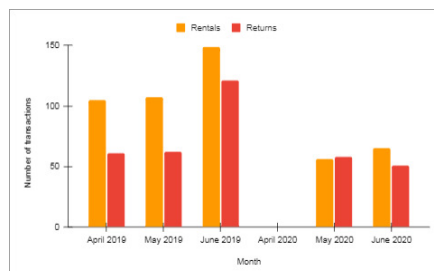
4.Piastowska (Starostwo Powiatowe)



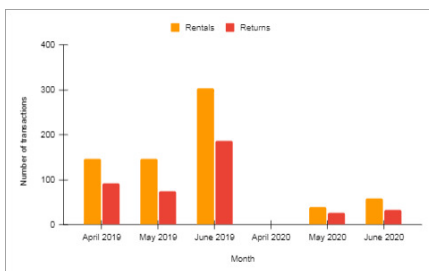
5.Cygański Las



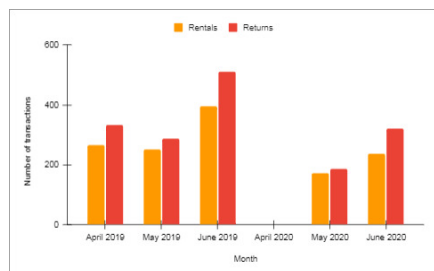
6.ATH



7.Konopnickiej – Basen

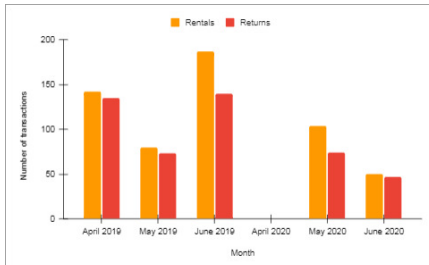


8.Partyzantów – Plac Mickiewicza

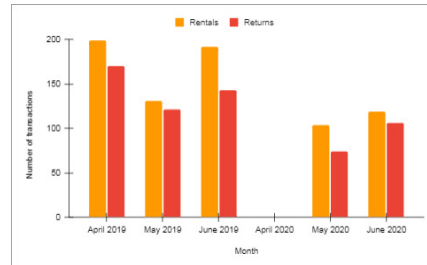


c.d.Fig. 5

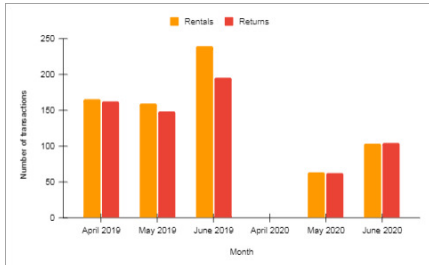
9. Babiogórska – Pętla



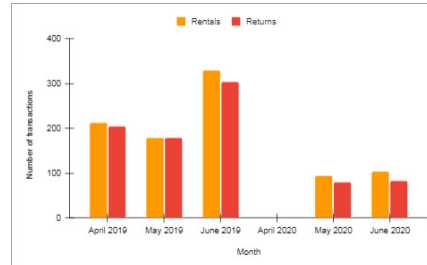
10. Spółdzielców



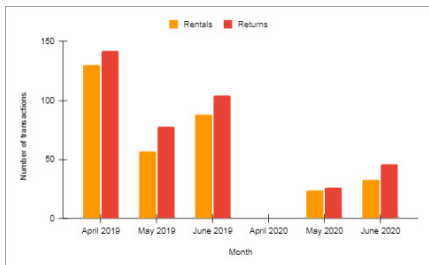
11. Łagodna – Złote Łąki



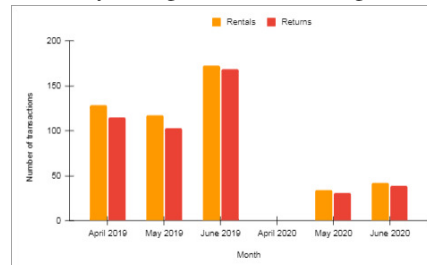
12. Sosnkowskiego – Basen



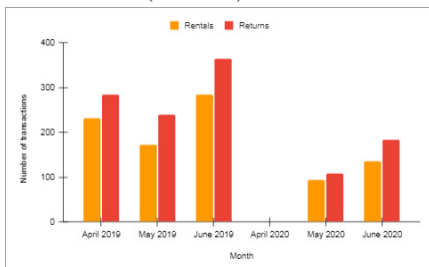
13. Św. J. Chrzyciela



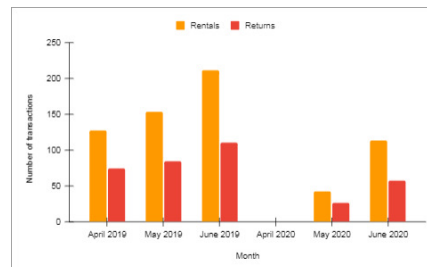
14. Grażyńskiego/Kwiatkowskiego



15. Mostowa (SFERA)

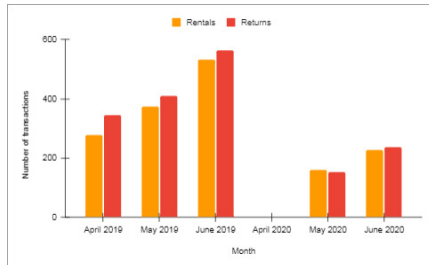


16. Lenartowicza/Jutrzenki

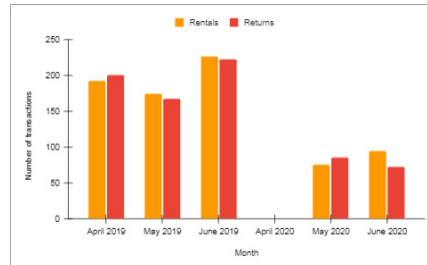


c.d.Fig. 5

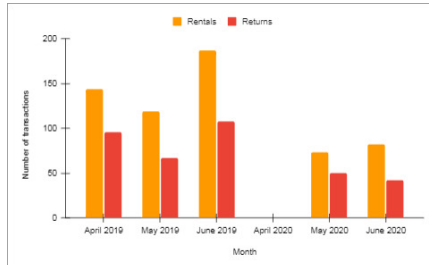
17. Bora – Komorowskiego (Gemini)



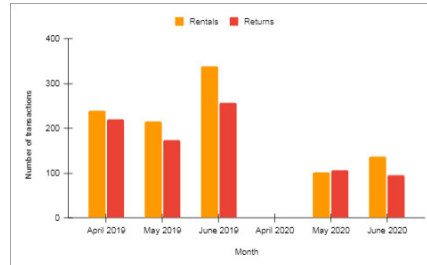
18. Górska – Bulwary Straceńskie



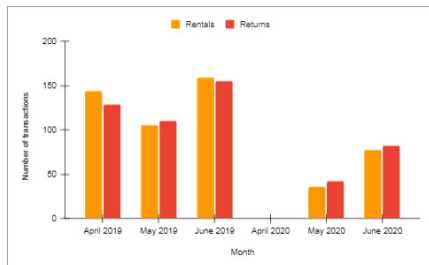
19. Boboli – Szpital Wojewódzki



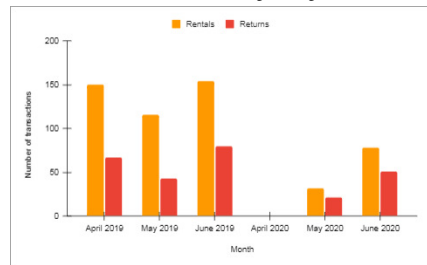
20. Lotnicza/Szarlotki



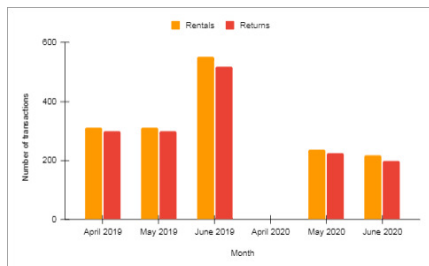
21. Gościnną/Kolista



22. Karbowa/Armii Krajowej



23. Zwardońska – Lotnisko



24. Jaworzańska – Stadion

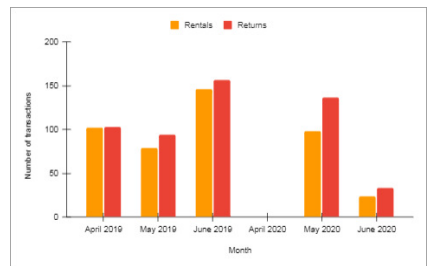


Figure 5. Number of rentals and returns to individual „BBbike” stations in the period from April to June 2019 and 2020

Below, in Fig. 6 the total number of renting and returns in the given months have been presented.

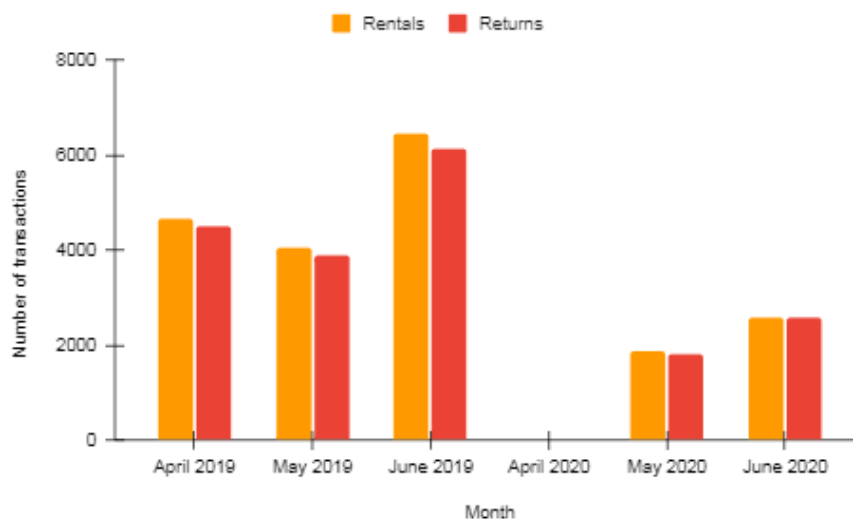


Figure 6. Summary of the total number of rentals and returns, specified in specific months

On the basis the data presented on the Fig. 6 can be concluded that in June 2019, the number of rentals reached over 6000. However, in the previous months - April and May, there were just over 4000 rentals. In April this year, the system was launched, but city bikes were not made available to customers, which was caused by the SARS-CoV-19 pandemic. Restrictions introduced by the government prevented users from using the city bike system, hence not a single bike was rented in April 2020. In the next month, on May 6, this year, with a delay of more than a month, city bikes were restored after the winter break. The system operator assured the customers about the disinfection of the station at the contact points by the staff during each visit to the city bike station in Bielsko-Biała [9]. The stations that attract the most attention among users are located near a shopping center, recreational areas and meeting places for many people.

5. Summary

The article presents an analysis of bike rentals and returns to "BBbike" city bike stations located in Bielsko-Biała. The three months of 2019 and 2020 were compared. Based on the presented analysis, the following conclusions were formulated:

- bicycle stations located near shopping centers, recreational areas such as: the promenade next to the airport or the mountain trail, are the most popular among users.
- the highest number of rentals took place in June (both in 2019 and in 2020), which is probably influenced by the end of the school and academic year and the change

to the warmest season, which is associated with a greater willingness to exercise among people.

- the current SARS-CoV-19 pandemic has a very negative impact on the operation of the city bike system, which brings a small number of rentals.

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