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THE IMPACT OF THE SARS-COV-2 PANDEMIC ON PARKING CHARACTERISTICS IN THE CENTRAL ZONE OF THE CITY OF NOVI SAD

Key Words

Parking
characteristics
SARS-CoV-2

Abstract

With the increase in the number of registered vehicles and the degree of motorization in Novi Sad, the requirements for parking have significantly increased. Research conducted in 2017 and 2019 determined the basic characteristics of parking in the central zone of the city of Novi Sad, and certain measures were given to improve the parking system. In the central zone of the city, it has been determined that the requests for parking exceed the capacities of the parking lot and in certain parts of the day they reach the value of up to 140% of the capacity. However, during the state of emergency caused by the SARS-CoV-2 virus pandemic, parking requirements were drastically reduced. Limited working hours of catering facilities, reduced scope of work of administrative centers, failure to hold sports and other events have led to the average occupancy of parking spaces on a daily basis being reduced to below the value of parking capacity (less than 100%).

1. INTRODUCTION

With the increase in the degree of motorization and individual motor traffic, Novi Sad has faced increasing traffic problems. Problems related to vehicle parking are among the most significant, given to lead to a number of negative effects, such as a reduction in the capacity of city roads conditioned by the slow movement of the vehicle and maneuvering in the process of parking, occupation of the intended areas movement of pedestrians and cyclists, irrational use of available areas, noise and exhaust emissions, dissatisfaction of citizens and users of parking lots, etc. The need to park vehicles in central city zones arises as a consequence of numerous factors, whereas parking requirements are random value. Constant increase in the number of direct parking requests is a consequence of:

- concentration of numerous activities in central urban areas;
- lifestyle changes;
- an increased mobility of the population;
- high representation of individual car traffic in the total traffic structure of mechanized modes of movement [1].

The SARS-CoV-2 virus pandemic has an impact (directly or indirectly) on all aspects of society. A large number of jobs and obligations are solved online, without direct contact between people. Visits to numerous administrative centers have been reduced to a minimum. A large number of smaller entrepreneurs were forced to stop their work, while catering facilities were partially or completely closed at certain times. Matches and sports events were held without the presence of the audience or with a drastically reduced number of people in relation to the capacity of the facilities. All decisions to prevent the spread of the virus have also reduced travel requirements, in other words reduced the need for people to leave their homes. The reduced demand for travel has the direct consequence of reducing the need for parking passenger cars in certain parts of the city, which in the previous period were characterized by great attractiveness and the need for free parking space. One of such zones is certainly the central part of the city of Novi Sad. This paper will present a comparative analysis of parking requirements in the central zone of the city, before and after the appearance of the SARS-CoV-2 virus.

2. FIELD OF RESEARCH

The research was conducted in the central zone of the city of Novi Sad, where based on previous research it has been shown that there are the highest requirements for parking [2]. Based on previous research, the idea came to the idea that these streets are in the extra zone in the tariff parking system, in the zone where parking time would be limited to one hour, and the use of parking spaces charged at the highest tariff [3].

The survey covered the following streets:

- Mihajlo Pupin Boulevard (section between the intersection with Narodnih heroja Street and Žarko Zrenjanin Street) - on both sides of the road,

- Modena Street,
- Ilija Ognjanovića Street (the part of the street with dead end to the intersection with Modena Street),
- Street of People's Heroes (Figure 1).

In the observed area, parking lots are organized as a street, with direct access to the road. Modena Street is in one short part one-way, while the road of other streets is intended for two-way traffic.

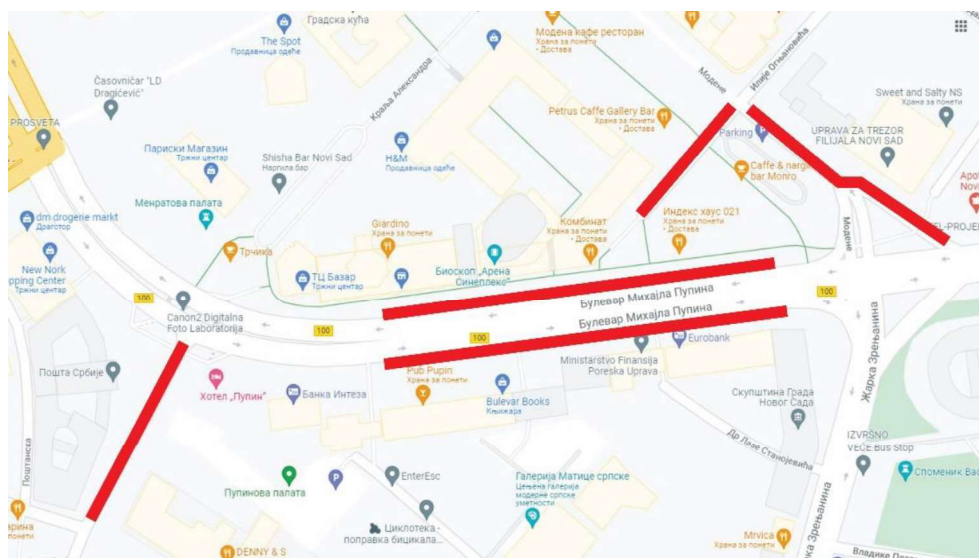


Figure 1. Overview of the research area

The original research was conducted in 2017, within the Smart Plan project, which was ordered by the City of Novi Sad. The second research was conducted in 2019, as a control counting and verification of requests, in order to start forming an extra zone in the parking system. However, with the appearance of the SARS-CoV-2 virus, from March 2020, the requirements have drastically decreased. So, the third research was conducted in October of the previous year, in order to determine the requirements in the period when there was a pandemic in the society. During the research, a full-day count of vehicles was performed in the parking lots, from 07:00 to 21:00, in the period when parking is charged in Novi Sad. The research, which was conducted in 2020, was conducted until 5:00 p.m. The reasons for the shortened research time are the measures to prevent the spread of the SARS-CoV-2 virus, which were currently in force. Namely, from 5:00 pm, all trade and catering facilities were closed. And as the administrative centers also worked part-time, after 17:00 in this part of the city there were no large requests for parking.

3. CHARACTERISTICS OF PARKING IN THE OBSERVED AREA WITHIN THE CENTRAL PART OF THE CITY OF NOVI SAD

The basic characteristics of parking, which can be determined by counting in the field, are: turnover, accumulation and durability of parking [1]. Table 1 shows the parking turnover by year. It can be concluded that the value of parking turnover was similar in 2017 and 2019. During the research conducted during the pandemic with the SARS-CoV-2 virus, a turnover of 6.89 vehicles per one parking space determined. It should be noted that in 2020, the research was conducted until 17:00, due to measures to combat the spread of the virus, which were currently in force. However, if the survey had been conducted by 9pm, as was done in 2017 and 2019, the value of the parking turnover would not have been much higher. This can also be seen on the basis of the accumulation, the occupancy of the parking space, which is shown in the following figure (Figure 2).

Table 1. Parking turnover

Year	2017	2019	2020
Parking turnover (veh./p.s.)	11,74	11,13	6,89

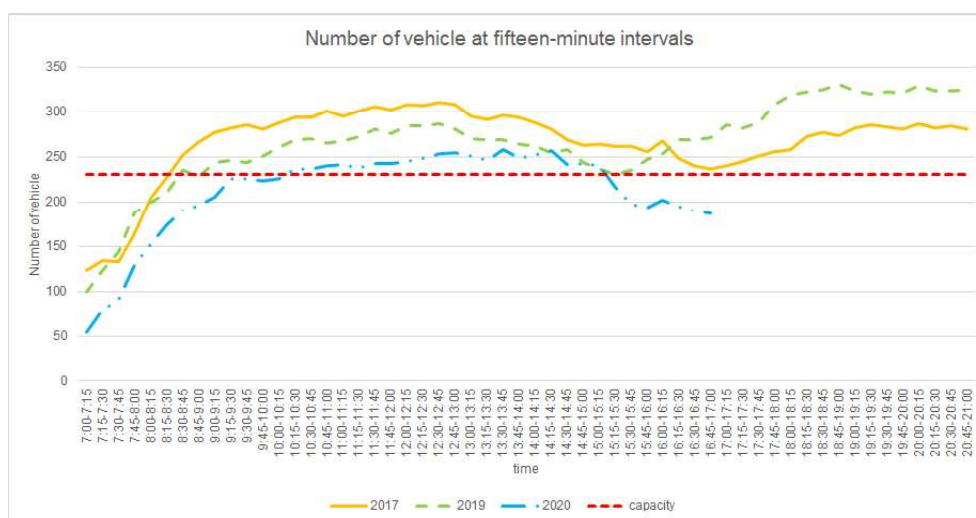


Figure 2. Occupancy of parking spaces at fifteen minute intervals

The diagram of the accumulation (Figure 2) clearly shows the classic display of parking space occupancy in the central zone of the city. There is a gradual increase in the number of vehicles in the morning and early morning hours to the maximum value, which is reached around 10: 00-11: 00 h. After that, the parking spaces are approximately constantly occupied until 14:00, and then there is a slight decrease in

the number of vehicles in the parking spaces. In the late afternoon, the demand for parking increases again until the end of the day. The morning accumulation of vehicles happens due to solving private obligations - going to administrative centers (tax administration, City Assembly, etc.), post office, banks, etc. Afternoon and evening accumulation of vehicles happens due to leisure and visits to catering facilities.

But when looking at the capacity of the observed area, in the first two surveys the utilization was greater than 100% during most of the day. The average capacity utilization in 2017 and 2019 was 115%, while the 2020 count determined an average utilization of 92%. Figure 2 clearly shows that the occupancy of parking spaces in 2020 was much lower in each part of the day than in the previous two surveys.



Figure 3. Parking durability – fifteen minute distribution



Figure 4. Parking durability - distribution by hour

If we are looking at the durability of parking, only one change can be observed during the 2020 survey compared to previous surveys. Namely, it can be seen that the share of short-term parking, parking up to 15 minutes, has increased. While in all other durability categories, the percentage of vehicles is approximately the same in all three surveys.

4. CONCLUSION

Problems related to vehicle parking are among the most significant problems in the field of traffic, which have arisen with increasing levels of motorization and individual motor traffic.

The emergence of the SARS-CoV-2 virus has an impact on all aspects of society. One of the direct impacts is the reduction of travel requirements, which has the direct consequence of reducing the need to park passenger vehicles in certain parts of the city, which in the previous period were characterized by great attractiveness. In order to show the influence of the appearance of the virus on parking requests, a research was done in the central zone of the city of Novi Sad.

The results of the research, which was conducted in the period before the emergence of the SARS-CoV-2 virus, during 2017 and 2019 and after the

appearance of the virus in Novi Sad, were compared. As the basic characteristics of the parking requirements, the following were determined: durability of parking, turnover and occupancy of the parking space.

When we look at the parking turnover, it is clear that in 2020, this value dropped drastically. This indicates the fact that one parking space was used by fewer vehicles during the observed period.

If the accumulation is observed, it can be concluded that during the entire observed period during the day, the number of vehicles in the parking lot was significantly lower than when the survey was conducted in 2017 and 2019. And during the appearance of the virus, in certain periods during the day, the occupancy of parking spaces exceeded 100%. This means that users leave their vehicles in places that are not intended for parking, which creates the problem of using other free designated areas (passages, green areas, etc.). At the same time, this confirms the conclusions from previous research that the observed area should be transferred to the extra zone in the tariff system of parking fees in Novi Sad. The research from 2017 and 2019 determined the average occupancy of parking spaces of 115%, while in 2020 it was 92%. This percentage is still high, so it is necessary to implement measures, defined within the Smart Plan project, in order to improve the parking system in the central zone of the city of Novi Sad.

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