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Analysis of the Problems Related to Traffic and Road Infrastructure in the Area of the Timisoara Student Complex

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ABSTRACT

A common problem in many cities is the continual growth in the number of personal vehicles, which creates numerous challenges and impacts on the environment, the local economy and, most importantly, on the communities and individuals who live and work in these areas. This increase in traffic brings to the forefront issues such as road congestion, air pollution, longer journey times and damage to existing road infrastructure. The aim of this paper is to investigate and analyze the impact of the increase in the number of personal vehicles on traffic and road infrastructure in the student complex of Timisoara. By studying this problem, possible solutions and measures were identified to effectively address these challenges and improve the quality of life of the residents in the area.

1. Introduction

In modern society, road traffic and the corresponding infrastructure are two fundamental issues that influence the quality of life of people living in an urban area.

Urban traffic is a key area of study in the planning and management of cities, especially developing ones, involving the flow of vehicles, people and goods moving on transportation arteries in urban areas.

Road infrastructure is a major issue for local government administrators and, like all other assets in a region, requires effective management. Such management should include not only the planning, implementation and monitoring of all activities related to the maintenance and development of the road network and its engineering structures, but also the creation of conditions conducive to the interactivity and efficiency of road infrastructure, while minimizing associated costs. (Świtała, 2023)

The rapid development of private motorization over the last two decades has contributed to numerous negative phenomena, affecting road transport safety and air quality in congested areas. The impact of transport on the environment is often adverse and unavoidable. (Skrúcany et al., 2017) The negative effects of traffic congestion are most evident in large cities, where traffic density is high and vehicle speeds are characteristically low and often variable, involving frequent accelerations and decelerations. (Raslavicius et al., 2015)

In recent years, the development of transport infrastructure has advanced considerably, but traffic problems continue to worsen due to the growing urban population that requires the use of these means of transport. (Medina-Salgado et al., 2022) This phenomenon has led to increasing problems related to congestion control, with a direct impact on citizens: air pollution, excessive fuel consumption, traffic violations,

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noise pollution, accidents and loss of time. (González-González et al., 2020)

The urban traffic problems that can arise from less than intelligent urban planning lead to several factors that affect the smooth functioning of cities, which will be briefly discussed below:

- Delays and loss of productivity: Traffic congestion leads to significant delays in the movement of people and goods, resulting in lost time and reduced productivity. (Button and Vega, 2021) Time spent in traffic means lost time for work, education, leisure and family. Congestion also has a negative impact on traffic reliability and makes it difficult to plan journeys and deliver goods. (He and Mak, 2024)

- Increased greenhouse gas emissions: Vehicles stuck in traffic consume more fuel for the same distance traveled in normal flowing traffic. This delay increases emissions of CO_2 and other greenhouse gasses, contributing to climate change and global warming. In addition, vehicles that idle for too long or travel at low speeds emit larger amounts of pollutants. (Wang and Hao, 2022)

- Impact on public health: High levels of traffic contribute to the deterioration of air quality in urban areas through the emission of fine particulate matter, nitrogen oxides, carbon monoxide, hydrocarbons and other harmful substances. (Li and Zao, 2020) Long-term exposure to these pollutants has been linked to a range of health problems, including respiratory and cardiovascular diseases. (Kim and Lee, 2023)

In this article, we examine the impact of the increase in the number of vehicles on traffic and road infrastructure in the student complex of Timisoara. The idea of this article stems from the observation that in recent years, the number of vehicles circulating in and around the student complex has increased significantly with the increase in the number of students who choose the city of Timisoara in the context of their academic development, but also their convenience to use, to a large extent, their personal vehicles as a means of transportation, generating various challenges and impacts on the daily life of the local community and the quality of the urban environment.

Timisoara's student complex is no exception to these problems, having witnessed a significant increase in the number of personal vehicles in recent years. In this densely populated area, characterized by the presence of student residences and numerous student facilities, efficient traffic management and the provision of adequate road infrastructure are crucial for the smooth functioning of the local community and the quality of life of students and residents.

2. Materials and Methods

A descriptive research approach was chosen for this work. The descriptive approach allows for a detailed examination of the characteristics and behavior of the studied phenomenon, identifying patterns and providing a clear picture of the current traffic and road infrastructure situation in the student complex.

Data collection was based exclusively on primary data, as this data is up-to-date and contributes to a greater extent to solving the traffic problem. One method in particular was used to collect the primary data: the questionnaire. To collect the data, an online questionnaire was created and distributed to students, university staff and anyone living in or near the student complex using Google Forms. The questionnaire assessed frequency of personal vehicles use, mode preferences and perceptions of traffic conditions and infrastructure. The questionnaire was distributed online via the Google Forms platform, and could be completed from 25 April 2024. A total of 92 valid responses were collected, ensuring an adequate representation of the sample.

The questionnaire was divided into four main sections, each of which aimed to explore a specific aspect of the impact of vehicles on traffic and road infrastructure:

- Demographic information: Questions on respondents' age, gender and status as a student, resident or employee.

- Use of personal vehicles: Questions about ownership and frequency of use of personal vehicles in and around the student complex.

- Perception of traffic and parking: Questions about perceptions of traffic congestion and parking availability.

- Participants' views on solving traffic problems: open-ended questions in which questionnaire respondents express their views on how traffic problems could be solved.

Figures 1 and 2 show the Student Dormitory Complex. The figures show the main streets within the complex. These streets were selected for traffic observation because they have a high volume of traffic, especially during peak hours. Figure 3 shows the occupancy of the parking spaces in the area of student complex, which is much higher than that of the specially designated parking spaces.

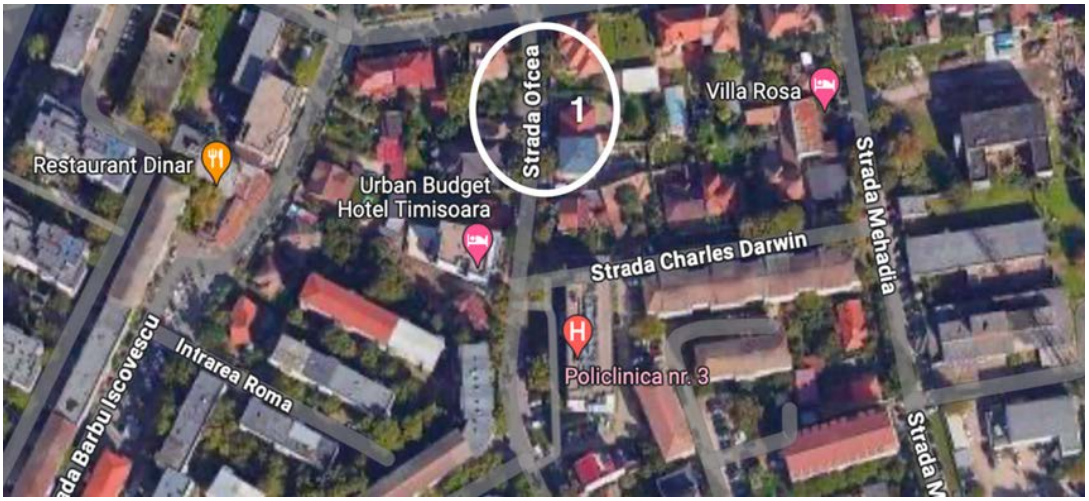

Figure 1. Data collection points on Ofcea Street (source Google Maps)

Figure 2. Data collection points on Vidu, Ripensia and Eroilor de la Tisa streets (source Google Maps)

Figure 3. Overcrowded parking lots in the student dormitory complex

3. Results and discussions

The analysis of the data from the questionnaire revealed the following, as shown in the figures below:

1. There are two peak traffic times: 7:30 ÷ 9:30 and 16:00 ÷ 18:00,
2. Traffic in the area of student complex has become very congested in recent years, leading to long waiting times,
3. More than 80 % of respondents believe that other means of transport should be used in this area and that awareness campaigns should be organized among the residents of this area and the citizens of Timisoara.

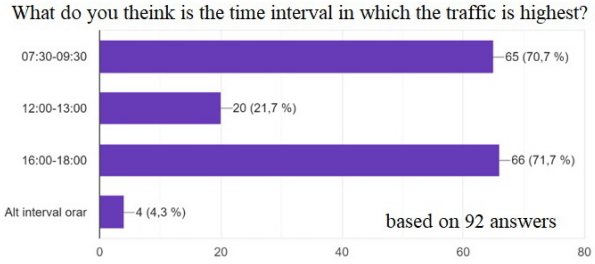

Figure 4. Time of day with the highest traffic

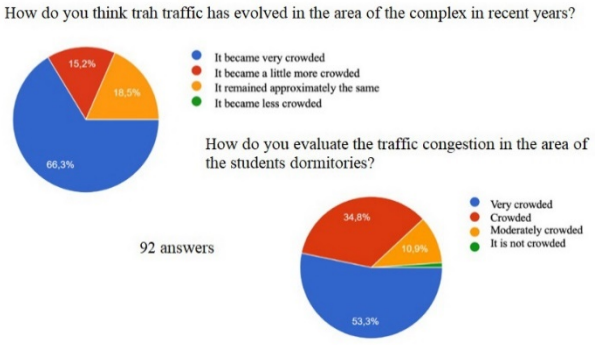

Figure 5. Traffic evolution in the student complex area

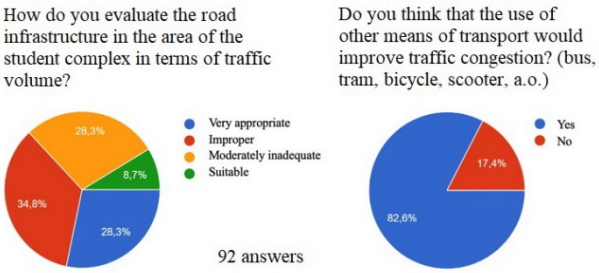

Figure 6. Road infrastructure assessment and improvement

Figure 6 provides general overview of the infrastructure within the student complex in relation to the existing traffic conditions. This aspect is particularly important for the permanent resident population. The questionnaire also included questions about suggested alternative modes of transportation for students to improve traffic congestion in the area.

According to the traffic measurements carried out in the studied area and the answers given by the target persons in the questionnaire related to the work, a significant increase in traffic volume was observed, leading to congestion on the main access roads to the student complex of Timisoara.

4. Conclusions

The student complex traffic study revealed an increased number of vehicles causing significant congestion during peak study times, which impacted traffic flow and increased travel time. Congestion also contributes to increased stress for drivers and pedestrians while reducing road safety by increasing the risk of accidents.
The road infrastructure was affected depending on the volume of traffic on the streets where we conducted the study. The streets have potholes and bumps in the asphalt, making traffic difficult and increasing the risk of accidents and premature damage to vehicles, while affecting the comfort and safety of drivers and pedestrians.
Responses to the questionnaire for the study revealed that promoting public transport and alternative modes of transportation can reduce congestion and improve urban mobility.

Acknowledgement

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Analiza problema vezanih za saobraćaj i putnu infrastrukturu u području studentskog kompleksa u Temišvaru

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INFORMACIJE O RADU

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Naučni rad

Ključne reči:
Saobraćaj
Putna infrastruktura
Praćenje saobraćaja
Saobraćajna gužva

I Z V O D

Zajednički problem mnogih gradova jeste kontinuirani rast broja ličnih vozila, što stvara brojne izazove i ima uticaj na životnu sredinu, lokalnu ekonomiju i, što je najvažnije, na zajednice i pojedince koji žive i rade u tim oblastima. Ovaj porast saobraćaja dovodi u prvi plan pitanja kao što su saobraćajne gužve, zagađenje vazduha, duže vreme putovanja i oštećenja postojeće putne infrastrukture. Cilj ovog rada je da istraži i analizira uticaj povećanja broja ličnih vozila na saobraćaj i putnu infrastrukturu u studentskom kompleksu u Temišvaru. Kroz proučavanje ovog problema, identifikovana su moguća rešenja i mere za efikasno rešavanje ovih izazova i poboljšanje kvaliteta života stanovnika ovog područja.