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TRANSPORTATION AND MOBILITY ANALYSIS OF A TARGET GROUP

Transportation planning is a complex task and a major challenge that plays primary role in the exchange of people and goods. Transport is often analyzed from a socioeconomic and spatial aspect through theoretical approaches for supply and demand of transport. The offer of transport can be expressed through the offered capability of vehicles or through the capacities of the transport network. The transport demand is analyzed by the number of passengers or loads transported at a time of a given distance. An initial representation of the theoretical approach in the analysis of the transport of people or urban mobility through description of a specific case is shown in this paper.

Keywords: Urban transport, mobility, transport analysis, transport planning, offer, demand

1. INTRODUCTION

In order to enable the operation of transport, large financial funds are needed which should be invested for its functioning, that is for the construction of the infrastructure, for the production and procurement of vehicles and for the organization and exploitation of the transport.

These investments are based on the analysis of the functioning of the transport service markets, by studying the characteristics of the demand, the characteristics of the offer and the transport service market.

1.1 TARGET GROUP

The target group whose mobility was studied was a group of students studying at several faculties in the city of Skopje. Common for all the students is the place of residence, i.e. the settlement Dame Gruev located in the municipality of Gjorce Petrov. From this group all the relevant information about their mobility was obtained through a survey process.

1.2 ENVIROMENTAL AND TRANSPORT CONNECTION CHARACTERISTICS

The settlement Dame Gruev is located in the west part of the city of Skopje approximately 7 km from the central area. It extends at 2,5 square kilometers with a modern urban plan and has around 15000 inhabitants. Nearby there is a military barrack and part of the railway that goes towards the cities of Kicevo and Prishtina.

Currently the only way to travel to other city areas is via the road network (city streets), because the existing railway is not used for urban transport and there are no other transportation alternatives. However the approach ("entrance" and "exit") of the settlement Dame Gruev is limited to one street that is through an overpass at the very beginning. The other way that does not represent a suitable approach to the settlement is through the city ring road.

Figure 1. Air distance between the settlement Dame Gruev and the city centre

2. OBJECT OF ANALYSES

This article contains analyses and descriptions of the transportation supply and demand, which affect the target group and the city in general.

2.1 ANALYSIS OF THE TRANSPORTATION SYSTEMS

Considering the transport supply, the alternative to the individual transport (cars) is the public city transport that is represented by the buses of the public enterprise (JSP) in Skopje. 3 different lines of the public city transport pass on the territory of the settlement, the buses 22, 22A and 64A. Two of them (22 and 22A) represent city lines, and the other one is a suburban line.

The line 22 has a length of 14,5 km with 30 stations from which 3 of them are in the settlement Dame Gruev. This line passes

throughout the most vital city areas. The travel time in one direction from the beginning to the end of the line is 1 hour, i.e. the duration of one rotation is 2 hours. The frequency of departure of two consecutive buses varies from 7 (in the morning) to 20 (in the evening) minutes. The line 22 is one of the most busy and most frequent lines in the city of Skopje with in average of 110 rotations per day. The other two lines (22A and 64A) have similar characteristics (length, stations, travel time) as the line 22, but different ending points and drastically less rotations per day.

Generally, on the lines throughout the city, the transporting is done by two-deck buses Fig. 3. These buses have length of 11,8 m, height of 3,9 m and capacity of 80 passengers (60 seating and 20 standing). In addition, there are also single-deck buses with a capacity of 50 passengers with various seating and standing combinations. In average, the commercial speed of the buses on the city lines is around 14 km/h. It should be taken in consideration

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that the legal speed limit in the cities in Macedonia is 50 km/h. The accuracy of the timetable of the busses is 5 to 10 minutes, and it depends on several factors. Also it should be emphasized that the frequency of the buses varies throughout the week, i.e. there is difference in the timetable on weekdays and weekends and holidays.
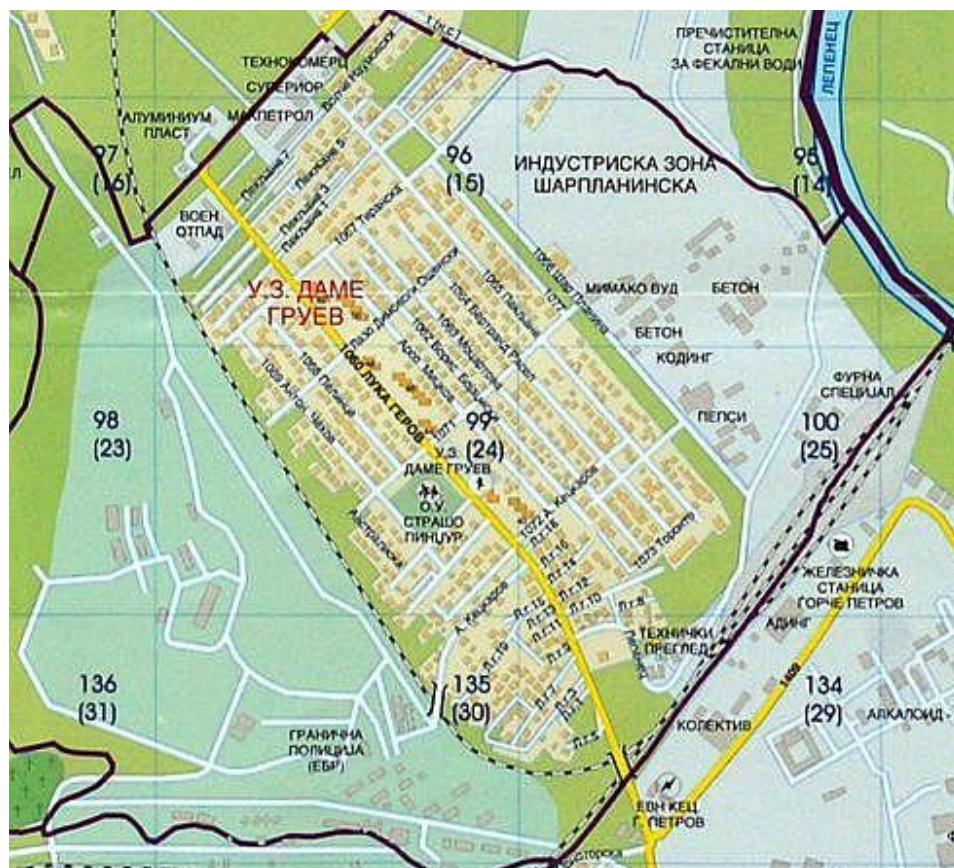

Figure 2. Map of the settlement Dame Gruev

2.1 ANALYSIS OF MOBILITY OF TARGET GROUP

Through the analysis of the target group, valuable information about their mobility has been obtained. Such mobility analysis variables are:

- Generation of trips;
- Destination of trips;
- Main and secondary motives for traveling;
- Distribution of trips by the means of transport;
- Time distribution of trips throughout the year, week and day.

These variables are used for determination of the transportation demand. From spatial aspect the people who travel to destinations near the route of the line 22, have no problem with the public city transport. For the other users of public transport who travel to different city areas, where there is no direct line from the settlement or the rotation intensity is very low (line 22A and 64A), problems occur which lead to loss of time and money.

In terms of transport capacity, there are major problems in the public city transport. The line 22 is one of the busiest and most saturated line in the city of Skopje, because it passes through the most frequent areas and settlements where it is the main transport supply. Due to this and the fact that the other lines (22A and 64A) have low frequency, the buses very often reach their maximum capacity. This mostly occurs in the morning hours (from 7 to 8 o'clock) and the afternoon hours (from 15 to 17 o'clock) when most residents have the need to travel.

Besides the capacity and frequency of the transport vehicles there are problems with the capacity of the streets. Because the infrastructure in the settlement Dame Gruev is reduced to one main street with two traffic lanes, the maximum traffic density is often reached. This condition affects all users of the road and leads to breakdowns in traffic flows, traffic accidents and overall low level of service.

Figure 3. Two-deck city bus

3. RESULTS

The current state based on the data from the analysis of the supply and demand indicates major transport problems in the settlement Dame Gruev and the city of Skopje in general. At the moment besides the individual and the public bus transport there is no alternative solution. Besides the improvement of the current transport offer, possible alternatives for the transport problems in the settlement Dame Gruev and the city of Skopje are:

- Construction of new infrastructure i.e. streets that will improve the access to the settlement and reduce the traffic volume on the existing streets. Positive sides to this solution are: traffic distribution, improvement of the level of service, increased traffic safety, faster time of travel and more. Negative when building a new infrastructure in city areas are the major costs and the problems that arise when constructing in densely populated places.

- Implementation of a tram in the public city transport in densely populated zones would generate great benefits for the users of the public and individual transport. With a tram solution there would be faster, more accurate and cheaper transportation for the users. This solution should be considered at the level of the whole city, and requires detailed analysis, planning and large investments for the infrastructure, vehicles and operation.

- Utilization of the existing railway in the public city transport can be done with an adequate reconstruction and integrating new lines. The existing railway lines pass through a few settlements in the city and most of them have little frequency of trains, which makes them suitable for this kind of transformation.

4. CONCLUSIONS

The analysis of supply and demand of transport represents compulsory process when there is a requirement for solutions to a certain transportation problem. This could be oriented to improvement of the existing state of the transport, as well as finding and implementing a new transport system.

The analysis itself is a complex and long term process that involves several areas of expertise. For the particular case stated above the results of the analysis indicate a major transport problem from several aspects. The solutions for this problem are proposed through three alternatives. The future research based on this analysis should be pointed towards the design of a model, which will serve for the prediction and planning of the mobility in the future.

With detailed analysis, careful planning and proper design, the urban transport can function properly. Skipping or leaving out some of the phases usually lead to problems which are manifested as a loss of time and money.

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