Novi Sad Mobility: Historical Background and Shifting Planning Paradigms

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This paper documents the increase in passenger car travel in Novi Sad during last 50 years and changes in modal split. Authors give their explanation of why these changes have occurred, and present key elements of the new transport master plan for the city.

Key words: Modal split, Transport plan, Urban mobility

1. INTRODUCTION

Novi Sad is a mid-sized city in The Republic of Serbia which historically has had a very significant practice of traffic planning and land use. Despite the fact that planning practice meant the application of state-of-the-art methodology of data collection and creation of traffic development scenario, the city has not succeeded in dealing with the consequences of increase in passenger car travel. For this reason, in pursuance of previous plans' drawbacks removal, the new action plan for traffic development from 2019 includes innovated guidelines for sustainable and smart traffic system management.

2. SOCIOECONOMIC CHANGES

The last fifty years have been characterized by a series of trends and economic/political circumstances which resulted in the increased number of the city inhabitants and the rate of car ownership (Table 1 and Figure 1). The development of cities in the Southeast Europe during previous decades has been characterized by non-planned city expansion and the increase

of possibilities of car ownership (Figure 2 and 3). Parallel to the changes in socioeconomic conditions in the surroundings, the attitudes and habits have been changed, regarding mobility. Most cities have kept the tendency to preserve the inherited urban structure of cultural-historic city centre and simultaneously increase their attractiveness. At the same time there is an increasing awareness of the accompanying problems of the modern traffic and its impact on the life quality in cities and towns.

Table 1. Socioeconomic trends in Novi Sad [1]

NOVI SAD	1976	2009	2017
Number of daily trips	500,021	744,745	766,777
Inhabitants	213,860	280,656	295,000

Figure 1 - Level of motorization in Novi Sad [1]

Figures 2 and Figure 3 show the trends of the increase in passenger car travel in Ljubljana and Zagreb,

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consequently, they are expected in Serbian cities, unless the traffic policy changes in relation to the period of the 1980s. The research studies conducted in 2017 and 2018 for the needs of Smart Plan creation showed that these trends are copied in Novi Sad.

Figure 2 - Level of motorization in Croatia and Zagreb [3]

Figure 3 - Level of motorization in Ljubljana [2]

The first traffic studies conducted in the 1970s and 1980s meant the application of the methodology “predict and provide” which resulted in further construction of street network and meeting the demands for more intensive use of passenger cars. The result of such practice with simultaneous increase in passenger car ownership inevitably was the increase in passenger cars in the network and new problems in city functioning.

3. MODAL SPLIT

A set of social and economic changes in Novi Sad led to the increase in the total number of journeys, over 30% in the period 1976–2009, which is proportionate to the increase in the city population (Table 1). Back in 1976, the total number of daily journeys conducted on Novi Sad territory was approximately 500.000, compared to 745.000 in 2009.

Over the same period, a change in the modal split also occurred, marked by significant increase in the number of trips made by passenger cars, accompanied by the corresponding decrease in public transport use. Public transport use declined from 28% to 22% in the

same period, accompanied by the increased participation of passenger cars in modal split (from 19% to 26%). In contrast, pedestrian journeys remained unchanged, accounting for 48% of the total (Figure 4).

Based on previous trends, as well as on the experience of more developed European cities, which faced the uncontrolled passenger cars use much earlier, traffic development plan from 2009, NOSTRAM, developed a new concept of future traffic policy. The basic principle of traffic management in cities was defined:

“For pedestrians, cyclists and public transport as much as it is necessary, for passenger cars the remaining part”.

Figure 4 - Modal split – Novi Sad [1]

Experts then assessed that it would be ideal to keep the current modal split at the same level in the following period, but it was not achievable. In keeping with that assumption and different development scenarios testing, a package of traffic policy measures was proposed. Target modal split for the year of 2029 was set, which includes:

- 30% private cars
- 30% public transport
- 40% walking and cycling.

The research studies conducted in 2017 for the needs of Smart Plan for traffic development included traffic demands and offers data updating. It has been determined that apart from the street network capacity, what was done for ten previous years in the field of public transport is negligible.

Gentrification of wider city centre occurred, as well as the increase in attractiveness of many city zones. The increased attractiveness was not accompanied by the construction of parking capacity, contrary to significant expansion of tariff parking zones.

This state unambiguously explains significant decrease in public transport use in modal split (the result of a survey in households).

Similar reasons and consequences were earlier noticed in surrounding cities (Figure 5, 6 and 7).

Figure 5 - Decrease in public transport passengers in Ljubljana (in 1,000) [2]

Figure 6 - Modal split – Ljubljana [2]

Figure 7 - Modal split – Zagreb [3]

Modal split in Ljubljana (Figure 6) and Zagreb (Figure 7) show that a similar situation happened in these cities 10-15 years ago, which resulted in serious changes in the planning methodologies and system management. It can also be concluded that with a high level of motorization rate, the participation of passenger car exceeds more than 50% in the modal split.

4. SMART CITY - ACTION PLAN [1]

Strategic and special goals defining for all fields of traffic system of Novi Sad were conducted in accordance with general goals of sustainable and smart city.

The transport model created in the software package VISUM was used for scenario testing. The test showed that the existing network burdened by future travel demands (matrix) at a large number of intersections and sections does not meet the demanded level of service quality. Regarding the street network capacity development, the measures which were inherited from the previous planning documentation were adopted and tested.

The most significant measures put forward in this Smart Plan, in the opinion of the study author, are the measures in the field of public transport, parking, cycling and pedestrian traffic. Action plan defines:

- Short-term measures by 2021
- Mid-term measures by 2027
- Long-term measures after 2027.

Long-term measures include significant infrastructure investment, such as the introduction of high-capacity public transport systems, the construction of park and ride systems etc.

This paper displays the short-term measures for all the stated transport modes. It is expected that revisions and transport model updating will be conducted due to timely monitoring in the planned period.

A. Short-term strategic goals in the field of public transport (by 2021)

- Carry out the rationalization of the zone system by enlarging, that is, reducing the number of zones. Introduce a zone system on the territory of the city and in the suburban area.
- Regulate the relationship of the City and Public Carrier by Public Service Contract.
- Introduce a contemporary public transport management system and form the Control Management Centre,
- Introduce a contemporary system of charging based on e-tickets. This goal is connected with the previous.
- On parts of the street network where general traffic influences the velocity of public transport vehicles

Introduce special lanes with a video monitoring. Gradually introduce the priority to public transport vehicles at critical intersections,

- Renew the bus fleet,
- Increase inspection activities for the suppression of illegal transport.

B. Short-term strategic goals in the field of parking (by 2021)

- Corrections of the existing parking regime. Proposal of the parking for „an extra zone“, as well as previous defining of certain parking spaces with the currently valid into another parking zone. Parking space within the campus to become a “white” parking zone.
- Corrections in the field of fare policy. Parking price correction in accordance with the trend of increase of the number of registered passenger vehicles in Novi Sad, average gross income and the price of an individual ticket in JGSP (Public transport carrier) Novi Sad in the first zone. A higher amount for the privileged ticket for the second car in the family.
- The change of the city Decision on determining fees for land development by which investors for the unbuilt parking places pay a symbolic amount to the city budget.
- Forming a special city earmarked fund from which money could be used for investing into the construction of parking garages and other off-street car park capacities.
- Removal of unregistered and damaged vehicles from the existing car parks
- Horizontal marking of parking lots would increase available space for parking, that is, the available parking surface would be most rationally used.
- A more active participation of communal police in detection and sanctioning of parking in green surfaces and other areas where it is not allowed.
- Zero tolerance to usurpation of parking places designated to the disabled.
- Possibility of reporting irregular and haughty parking by citizens via MMS messages or other multimedia services.

C. Short-term strategic goals in the field of pedestrian and cycling traffic (by 2021)

- Increase of the safety level of pedestrians and cyclists on the street network of the city of Novi Sad.
- Remediation, reconstruction and modernization of the existing pedestrian and cycling infrastructure.
- Application of the basic parameters of design and cycling infrastructure which are in accordance

with the contemporary manuals for cycling traffic design and planning.

- Application of contemporary solutions in the field of cycling and pedestrian traffic regulation.
- Development of the system for offering services in cycling traffic.
- Expanding services intended for cyclists.
- Promotions, education and campaigns conducting related to pedestrian and cycling traffic.

5. CONCLUSION

The expansion of Serbian cities and the increase in motorization levels clearly identify the need for passenger car (PC) usage reduction. There are many reasons behind this initiative: ineffective use of transportation network capacity, congestion increase, and significant time lost as a result of inefficient transport system, vast specific consumption of unrenovable energy resources, excessive air pollution and noise, large number of traffic accidents, degradation of living conditions, etc. Although competent international associations and reputable scientists frequently warn of the fact that global warming and degradation of life quality in cities may be significantly reduced by rationing car usage, in practice, the use of individual transport modes in Serbian major cities is on the increase.

Traditional approach in transportation planning meets passenger car travel demands through further street network capacity construction. In contrast, modern approach relies on managing transportation demand, more extensive use of public transport and introduction of other environmentally friendly modes of transport. In order to achieve the goals of sustainability, a set of different transport policy measures, land use measures and technological innovations are need to be implemented.

Plan of activities is essentially the output result of every strategy. In accordance with the above mentioned goals, within the study SMART PLAN - THE SECOND PHASE, a plan of activities was stated in the field of public transport, parking and cycling and pedestrian traffic. For each activity, action plan and the assessment of the means necessary for the realization have been defined. Plan of activities includes the description, purpose and expected results.

For a number of the proposed activities the need for justification analysis was estimated (or its existence has been stated), and the following information is provided: the documentation necessary for the implementation of the activities, dynamics and the estimated implementation time, activities operators and the assessment of the means necessary for the realization of the proposed measure.

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REZIME**MOBILNOST U NOVOM SADU: ISTORIJSKA POZADINA I PROMENA PARADIGME**

U ovom radu prikazan je porast broja putničkih automobila u Novom Sadu u poslednjih 50 godina kao i promene u raspodeli putovanja na vidove prevoza. Autori daju svoje objašnjenje zašto su se ove promene dogodile i u radu predstavljaju ključne elemente novog plana razvoja saobraćaja za Grad Novi Sad.

Ključne reči: *raspodela putovanja na vidove prevoza, transportni plan, urbana mobilnost*