BENCHMARKING NEW CONCEPTS OF URBAN MOBILITY: THE CASE STUDY OF THE CITY SKOPJE

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The concept of smart city has been introduced to face the challenges of developing more attractive, sustainable and efficient cities. In transport this concept means that several entities communicate among themselves. So, no city can become “smart” if its infrastructure for mobility is not in accordance with this concept. Current infrastructure enables information sharing between users by the means of smart phones, information systems and variable message signs. In the future one can expect also communication between the vehicles and the infrastructure. When new concepts of urban mobility are introduced today, one has to take into account also how the new concept is suitable in the sense of smart urban mobility. An appropriate benchmark has to be defined in order to choose the best solution.

This paper describes the research and results of the traffic research study with micro simulations encompassing the central urban area of the city of Skopje. Over the past decade, the capital of the Republic of Macedonia – Skopje, has experienced significant social transformations, economic challenges and environmental issues. With a population of over 600,000 inhabitants, and as the Macedonian centre for administration, education, and business institutions and activities, the city faces a constant increase of travel demand. To cope with it a Traffic Management and Control Centre using the UTOPIA adaptive system monitors and manages 100 intersections in real time. Despite this measure, increased travel demand resulted in severe congestion during morning and afternoon peak hour. This causes significant problems

in traffic that plaque the city of Skopje today. Aiming at higher quality level of traffic management and reduction of congestion, the city authorities have introduced *a new* approach to decision making. A city transport model of the existing and proposed concept has to be made to enable a simulation based verification of the proposed concepts. Solution sustainability has to be tested using short and long term traffic density predictions for the planned future period (years 2024 and 2034). For this decision process, a benchmark was defined to take into account the possibility of embedding the solutions into the smart city infrastructure and to ensure improvement of the overall level of quality, and mobility for all users of the transport and traffic system.

For traffic flows modelling the micro simulation software PTV VISSIM was used. To create realistic models, traffic data from inductive loops have been used and field measurements have been made. The model for the base year 2014 has been calibrated and validated by means of GEH statistics and the t-test. The GEH statistic is used to compare observed volumes with those obtained. The t-test is used to obtain the significance of mean differences in travelling time. It shows, with a risk of 5%, that the differences between the model and the empirical measurements are not significant, and that the model reflects the real situation on the field. Three proposed solutions were tested on micro simulation models created for both, morning and afternoon peak hour. Best one is chosen according to the defined benchmark.

Key words: urban mobility, smart city, traffic congestion, analysis and simulation modelling