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EDITORIAL

NEW METHODOLOGY FOR SUSTAINABLE DEVELOPMENT TOWARDS SUSTAINABLE TRANSPORTATION SYSTEM

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The 7th International Conference on Environmental engineering was held in Vilnius (Lithuania) on May 22–23, 2008. More than 250 participants from 29 countries attended this conference and presented their reports in 6 sections: environment protection, water engineering, energy for buildings, urban transport systems, roads and railways, technologies of geodesy and cadastre. Some papers have been included into the special edition *Towards Sustainable Transportation System*.

The special edition mainly focused on the sustainable territorial planning, especially planning of implementation stage, and described the new decision-making ways, solutions, and the new technology application for a special case study. The first paper describes the methodology for the creation of future insights, the principles of application of the expert method, the types of future scenarios and their application in drafting the general plan of the territory of Molėtai district. Future insights are one of the key measures that could help the public realise its own freedom conception through changing the future. Planning their future, public authorities make decisions that will have significant impact on future events and processes. The results of the taken decisions have a long-term effect.

The key method for insight forecasting is the *scenario* method. A scenario is a plot of potential multiple future versions: from a simple consideration of potential events of unknown future to analytically grounded future shapes linked by complex relations.

Estimation by experts is understood as a summarised opinion of an expert group drawn on the basis of knowledge, experience and intuition of experts. The procedure of the estimation by experts allows combining opinions of individual experts and formation of a joint solution.

Forecasting or planning situations or events, the experts usually are given a task: to estimate a problematic and complicated situation and to come up with several possible alternative situation estimations and several versions of a forecast or a plan. All scenarios are analytical

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and clearly defined constructions of the future that present a set of possible alternatives. Every scenario is based on certain presumptions and conditions. The goal of scenario method is to look at the functioning and internal links of a complex dynamic system.

General and strategic plans could constitute an integral part of complex plans and at the same time supplement each other. A complex plan of a territory could perform the formation of strategies of urban development and function as a tool for social management of investments, which could be also financially supported.

The General Plan could cover all the fields of activities and reflect their long-term development. It would provide with more detailed ways of how to achieve the objectives set on a lower level of the territory planning. It would also specify prospect territory development directions and the term of implementing the objective set, as well as territories favourable for future investments. The Comprehensive Plan (territory) could focus not on the economic development, but on the identification of territories suitable for the economic development. The Strategic Plan (economic) could define main directions of territory development with regard to financial resources as well as starting norms for all the planning activities. Short-term economic plans could be based on a programme chosen by the Government and could function as an instrument of the budget formation. The planning complexity enabled the country to a more economical use of its financial and intellectual resources for drafting all national plans.

The implementation of the idea of sustainable development is discussed in the article that addresses sustainable communities.

The Government of the United Kingdom has defined a sustainable community in its Sustainable Communities Plan (Office at the Deputy Prime Minister 2003): sustainable communities are places where people want to live and work, now and in the future. They meet the diverse needs of existing and future residents, are sensitive to their environment and contribute to a high quality of life. They are safe and inclusive, well planned, built and run and offer equality of opportunities and good services for all. For communities to be sustainable, they must offer hospitals, schools, shops, good public transport, as well as a clean and safe environment. People also need public open space where they can relax and interact and the ability to have a say on the way their neighbourhood is run. Most importantly, sustainable communities must offer decent homes at prices people can afford. The term "sustainable communities" has been around since the 1980s (Frobeen 2006) in a number of countries across the globe and links all the definitions of sustainable communities with the common themes of environmental, economic and social sustainability principles. Castlefields has a very real chance of becoming a sustainable community, but only when the economic initiatives are provided. The research identifies the urban regeneration programme as being one of the effective solutions for dealing with deprived areas. Therefore, as envisaged in the UK government's Sustainable Community Plan, urban regeneration has tremendous potential in creating sustainable communities in areas like Castlefields and elsewhere.

Development of new methodologies creates conditions for the balance of passenger demand and supply in the public transport.

Newly developed REDECON methodology and its pilot application enable the analysis of a current situation of regional public transport systems what was shown by the case of pilot project in Prekmurje region.

The use of REDECON methodology also showed that it represents an adequate tool for:

a) identification of locations, where public passenger transport supply is not in balance with (theoretical) demand potentials, and
b) testing of taken measures for improving the public passenger transport system in regional point of view.

The public passenger transport supply in the dealt area, chosen on the results of the REDECON methodology, significantly arises. Thus, the authors proved that response to changes in quality or fares reduction of public transport supply is elastic.

Environmental pollution in towns is significantly impacted by the fuel type of the public transport vehicles.

The problem of pollution exists since the invention of the motor vehicle gaining in significance with the development of transport and the expansion of motor vehicle use and becoming a major concern of organizations dealing with the environment protection. One of the results of concern about the state of the environment is the standards of permitted detrimental gas emissions produced by motor vehicles. Today's standards (EURO IV – applied since October 2005 and EURO V – implemented from October 2008) allow for very low levels of emissions and they will certainly contribute to the application of modern technical solutions for meeting these standards. Conventional diesel buses are used not only in Belgrade, but also in Serbia at large. It is necessary to find new solutions for alleviating the problem of environmental pollution while taking into account other criteria relating to the advantages of alternative fuel use: economic efficiency, availability, security, energy efficiency, etc. Using buses on natural gas propulsion and biodiesel would significantly reduce the emission of pollutants which would improve quality of life in urban centres. With economic regard, the application of natural gas is a solution that would pay for itself in a very short time. At the moment, the major constraint for more extensive use of these buses lies in the fact that Belgrade does not have a network of stations for this type of fuel. On the other hand, the application of biodiesel for bus propulsion is constrained only by the possibilities of local producers. It should be kept in mind that this fuel has the highest potential to lower dependence on the import of oil.

Finally, in order to implement alternative solutions of urban transport as quickly as possible, it would be necessary to provide regulations and fiscal stimuli.

Road pricing is another tool for implementing the sustainable transport system.

An important and non-trivial aspect of road pricing is its technical implementation. This includes the overall system architecture, the technical design of toll plazas, the provision of secure payment systems and the day-to-day operation of all the electronic systems involved. Transaction costs, i.e. the costs of the implementation of the system, are also very important, as they are deduced from the welfare benefits of the system. Road pricing has also a role to play in the optimisation of the efficient operation of an urban area.

The objective of the study described in this paper was to develop, by heuristic methods, an optimal tolling scheme for a complicated road network. Realistic parameters for resource

costs, time costs, external environmental costs and tax rates were used. The reduction of traffic caused by increased prices as well as route changes induced by tolls were taken into account, but some other effects, such as travellers changing their destinations or shifting to another mode, were not included. The main objective was to maximise the social welfare gain but possible adverse effects of tolling on traffic streams were also investigated.

The authors studied the pros and cons of a cordon tolling scheme and a corridor toll. A combination of these two tolling schemes gives the best results, both in terms of welfare gain and traffic streams. The welfare gain, for that matter, appears to be rather modest. The more so if one keeps in mind that the implementation costs of the tolling schemes have not been deducted from these welfare gains.

Static traffic assignment was used in this study. Moreover, they averaged over all types of vehicles. It would be interesting to see if dynamic traffic assignment using multiple user classes (passenger cars and lorries) would lead to essentially different results.

Active society encourages to look for the new ways when developing the public transport.

Several legislative initiatives to construct new roads in Liechtenstein have been defeated by the residents. Because of the resistance against new roads the government decided to analyze other possibilities to shift the mode share towards public transportation systems (Regierung Fürstentum Liechtenstein 2004a and 2004b). Hence, the only way to handle the increased demand seems to be a massive improvement of the public transportation system, combined with measures to limit the car usage.

For evaluating an appropriate alternative three perspectives – customer, public transport company, and general public – were surveyed. All relevant criteria and measurement methods for each group were defined. Finally, the following criteria were estimated for each alternative:

- Number and geographical location of stops
- Frequency and operation hours
- Average travel speed (especially along the high demand axis)
- Reliability in term of conflicts with other transport modes
- Direct connections
- Capital costs
- Annual capital costs and operating costs.

The developed alternatives combine possible PT systems (e.g. S-Bahn, bus, tram, VAL) in a way that an attractive PT network results, with adequate services, amenities, and different routings.

NPT systems, defined as new guideway transport systems introduced into a city/region, often contains a form of new technology (e.g. automated people movers). NPT systems can be considered in regions with an existing well-developed fixed guideway network. Many of NPT systems have not been successful in the sense that they are not extended or built in other cities. The Liechtenstein case study provided the opportunity to analyze the benefits and weaknesses of those systems.

The urban planning literature contains definitions of activity centres, typically defined as areas with higher than adjacent concentrations of employment at the traffic analysis zone

(TAZ) level. This definition has proven satisfactory in the analysis of polycentric areas' employment patterns, residential location theory, and overall economic analysis.

Research of traffic analysis zones in Vilnius city showed that not all traffic analysis zones could be possible to consider like transport activity centres. Such kind of problematic situation is in the central part of Vilnius and in the TAZ which are in a distant area of the central part of Vilnius. The main reason is a large disproportion of population and working places density in these areas.

The second stage of this research represents a GIS-based methodology for Vilnius city traffic analysis zones ranking. Created GIS application with two calculation methods of decision support system *TOPSIS* and *SAW* performs TAZ ranking. Analysis of Vilnius city TAZ showed that the best transport situation is in peripheral part of the city (Santariškės and Žemieji Paneriai transport activity centres).

All articles within this digest present different methods and means for determining and assessing the traffic system sustainability, as well as for the improving the quality of living and reduction of pollution. These issues are urgent and important for all states irrespective of their economic level, climatic and other conditions. And sharing opinions and participation in scientific discussions promote the dissemination of scientific methods and stimulate progress in the field of communication systems.

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