TEACHING MATERIAL GUIDANCE

1) Title of the material

Tiwari, G.; Jain, D.; Ramachandra Rao, K. Impact of public transport and non-motorized transport infrastructure on travel mode shares, energy, emissions and safety: Case of Indian cities. Transp. Res. Part D Transp. Environ. 2016, 44, 277–291, doi:10.1016/j.trd.2015.11.004.

https://www.sciencedirect.com/science/article/abs/pii/S1361920915001984

https://trid.trb.org/view/1403608

2) Which section of the SUMP it is relevant to?

The scientific article could be associated with the third, fourth and sixth section of SUMP circle related respectively to analyse mobility situation (especially analyse problems and opportunities for all modes – subsection 3.2), build and jointly assess scenarios (develop scenarios of potential futures – subsection 4.1.) and set targets and indicators (identify indicators for all objectives – subsection 4.1).

3) Which Mobility Manager knowledge this material is the most relevant to?

It is related to urban and spatial planning (section 3 of the Mobility Manager competencies). The report has also a direct reference to Section 1, especially 1c (understanding of travel behaviour) and 1e (Evaluation of transport measures).

4) Problem approached and content overview

Problem approach – general understanding nature of challenges related to urban modal shift, how modal split influences the reducing of the environmental impact of the transport system (energy use, emissions and road traffic safety).

The authors have studied the travel behaviour of three medium-size Indian cities – Udaipur, Rajkot and Vishakhapatnam. The impact of improving built environment and infrastructure on travel mode shares, fuel consumption, emission levels and traffic safety in Rajkot and Vishakhapatnam have been analysed. For studies three scenarios were developed – improving the only infrastructure for cyclists and pedestrians, improving only Public Transport (PT) infrastructure and improving them both.

Travel trends of six Indian cities of different population sizes were studied. Mobility and safety indicators for three cities – Udaipur, Rajkot and Vizag were presented. Data from Rajkot and Vizag were used to develop scenarios of infrastructure development. The impact of change in built environment and infrastructure on mobility and emissions from passenger transport were analysed. Impact of the scenarios was analysed on safety indicators for the city of Vizag. Three scenarios were proposed to estimate the impact of change infrastructure improvement on travel patterns and resulting change in energy, environment and safety indicators. Scenario 1 included improving facilities for non-

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motorised travellers with bicycle lanes on arterial roads and safe crossing facilities at intersections. Scenario 2 included prioritizing of bus operations, bus lanes along arterial roads together with improved bus stop location and design and scenario 3 included both facilities for cycling and buses.

The impact of improvements on modal shift was determined in two steps. Firstly willingness of travellers to shift from motorised vehicles to cycling mode and PT were determined based on the literature review of stated preference studies conducted in seven Indian cities. Finally, the respective shifts were estimated based on the trip length-frequency distribution of each transport mode from which the shift was expected. It was assumed that improving cycling infrastructure should cause a share of trips to shift from motor vehicles and public transport having a trip length less than 5 km to non-motorised mode. Similarly, improving bus infrastructure should cause a share of trips to shift from motor vehicles having trip length more than 5 km to bus.

The study showed the strong role of cycling infrastructure in both cities despite geographical dissimilarities. The scenario analysis showed maximum reduction in CO2 emissions is achieved when both PT and cycling infrastructure are improved. Improvement in safety indicator was also highest in this scenario. Improving only PT infrastructure might have a marginal effect on the overall reduction of CO2 emissions and adverse effects on traffic safety. Cycling infrastructure is crucial for maintaining the travel mode split in favour of PT and walking/cycling in future.

5) Who could be interested in this material?

This article is addressed to students and those looking for a well-structured and concise introduction to transport infrastructure and mobility management (in terms of the influence of the infrastructure elements of the transport system) and the factors influencing an environmentally friendly modal split. Students specialising in public transport and cycling may be interested in broadening their view of urban mobility as a complex system with many actors and factors. The article contains many references to scientific literature in the mobility management research area.

6) What is worth mentioning as an innovative factor for the reader?

A good selection of illustrative data and facts on urban transport infrastructure (especially public transport and cycling), useful both in the introductory parts of projects or theses and in developing research methodologies. The article also includes a description of factors and indicators useful for evaluating proposed improvements to the transport system. The proposed indicators may also be useful in monitoring the effects of measures planned or implemented as part of the SUMP. The article contains many references to the scientific literature on the impact of bus and cycle infrastructure on the efficiency of the transport system in an urban environment. These references may be useful in the framework of projects and theses being developed.

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7) Limitations

The research was conducted for Indian cities with specific modes of transport, which may not be appropriate for European conditions. The models and methodology presented are somewhat simplistic and the article does not present the verification methods. Nevertheless, the approach to the topic and the indicators and factors considered, as well as the references to scientific literature, are a valuable source of inspiration for preparing SUMPs or for research on the impact of changes in infrastructure on modal shift.

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