Journal of Advanced Transportation, Vol. 38 No. 1 pp. 1-4
www.advanced-transport.com

EDITORIAL

Special Issue: Importance of Public Transport

Guest Editors:
Jan-Dirk Schmöcker
Michael G. H. Bell
William H.K Lam

The transport demand in most major cities around the world can only be met with a high-quality public transport system. The requirements on bus, rail, underground and tram systems are manifold with reliability and efficiency as the key factors. The service operating hours and the size of the network are often extended in order to serve the needs better. Further, most metropolitan areas are trying to provide more incentives for citizens to leave the car at home and use the local transit systems instead. The reasons are well known. Not only does a public transport system only make economical sense if it is well used, but most urban areas with a high car-dependency face at least three major problems; safety, congestion, and pollution (noise and air pollution, land separation, etc.). It is generally recognised that to decrease car usage and to increase public transport usage a stick & carrot approach is needed. The London congestion-charging scheme is an example since all revenues collected by the scheme are put into the improvement of bus and underground services.

Capacity Constraints

London is further an example that not only the road network has reached its capacity but also certain public transport services. Travelling during the morning peak-hour on buses, commuter trains or the underground can be an unpleasant experience. Passengers trying to board

Jan-Dirk Schmoecker is at the Centre for Transport Studies, Department of Civil and Environmental Engineering, Imperial College, London, U.K.
Michael G. H. Bell is at the Centre for Transport Studies, Department of Civil and Environmental Engineering, Imperial College, London, U.K.
William H. K. Lam is at the Centre for Transport Studies, Department of Civil and Environmental Engineering, Imperial College, London, U.K.

within Zone 1 (Central London) might have to let a train go because of insufficient space. To raise public acceptance for the congestion-charging scheme, capacity problems on buses and the underground clearly need to be addressed. Asian cities like Hong Kong, Tokyo or Osaka are examples of cities with similar transit capacity problems.

To increase capacity, new lines could be introduced, the infrastructure upgraded, the service frequency increased or the existing capacity could be used more efficiently. In fact upgrading the infrastructure and increasing the service frequency is often the same for rail and underground systems, because signalling systems and turnaround procedures determine the maximum line frequency. Often the capacity constraints are due to access problems for passengers. Therefore "the walking infrastructure" - like station and platform access - needs to be looked at as much as the service frequency.

Optimising the line usage requires us to understand where the bottlenecks are. If these are correctly estimated, methods can be developed to spread the demand towards less utilised lines within the network or less busy times. Methods need to be developed that address the transit capacity constraints correctly and predict passengers' route choice correctly. In this context the "common line problem" (CLP) has to be mentioned as this makes public transport assignment fundamentally different to route choice on road networks. Often passengers include several lines in their route choice set, for example all lines going from the origin to the next hub. The choice of line is then often made at the bus stop/station only depending on the arrival times of the services in relation to the arrival time at the transit stop. Thus, the optimisation of network usage needs to correctly take into account of user behaviour, including of course responses to common line situations.

The Role of Information

Recently there have been several papers published on transit assignment with common line problem and capacity constraint. However, there are clearly areas which have not been addressed sufficiently yet. Modelling the sequence of boarders (not FIFO but also not random) as well as bus-service characteristics (like bus-bunching and overtaking) are two areas that need further work.

Further, most papers written on assignment and the CLP assume that passengers are not well informed about the arrival time of the next or subsequent transit vehicles serving their current stop. In consequence it is assumed that passengers will take the first vehicle arriving, which is included in their choice set. With better and more accurate information at or even before arriving at the transit stop this might however not be true anymore. In fact, there is no CLP if passengers are perfectly informed about the current and future state of all services.

The provision of better information to customers as supported by the collection of more information on travel patterns through electronic ticketing systems, offers new opportunities to improve transit utilisation. Fare systems could be developed that discourage travel through bottlenecks in the system. Travelling during peak times and on busy line sections could be priced much closer to the marginal costs than is the case with current fare structures. Limits are only given by the requirement to keep any fare structure transparent and fair.

Contents of this Special Journal

The idea for this Special Issue grew out of the organization of the Advanced Study Institute (ASI), which was sponsored by the Croucher Foundation (http://www.croucher.org.hk/) for the dissemination of knowledge and the formation of international scientific contacts on advances in modelling public transport systems. Capacity constrained transit assignment was a central topic at the ASI Workshop in Hong Kong, 9^{th}-13^{th} December 2002. The proposal for this special issue focused on public transport modelling was developed there and participants of the workshop were invited to submit papers. The five papers presented in this special issue look at different aspects of an efficient and reliable public transport system.

The first paper by Poon *et al* looks at capacity restrained transit assignment. The simulation-type transit assignment tool recently proposed by the same authors is applied to a large network (Hong Kong Mass Transit Railway). Time varying demand is modelled over the peak period for a schedule-based service.

The following paper by Miller *et al* also deals with congested transit assignment. It looks at the possibility to determine the "ex-ante reliability" consisting of travel time reliability, schedule reliability and direct boarding-waiting reliability. The paper shows the impact of alternative timetables and vehicle fleet changes to the above reliability measures by applying their proposed method to a small example network.

The third paper written by Ling and Shalaby looks at one specific measure to improve service reliability for tram services. The idea is to use signal control to regulate headways and to minimise the disruption for traffic crossing the tramline. The research is supported by a case study where the impact of the proposed Adaptive Transit Signal Priority is modelled along a route in the Toronto area.

The paper by Hoogendoorn *et al* proposes a framework for the modelling of pedestrian movements. Contrary to the transit assignment models an infinite number of paths are available to the traveller in a continuous time-space dimension. The model is dynamic and considers the interaction of travellers. The modelling of crowded public transport interchanges is critical to understand the line utilisation of a transit network.

The final paper looks at a very different aspect how to improve the efficiency of a public transport service. If a bus-operator can improve the behaviour of drivers this might attract new customers and it will certainly save fuel and maintenance costs. The impact of aberrant driver behaviour, like sudden acceleration and breaking or aggressive driving styles, is analysed and quantified. Based on a case study with 76 drivers over six months the paper proposes seven indices on which driver performance can be monitored.

Acknowledgements

The authors would like to thank the reviewers of papers for their active and enthusiastic contributions to this special issue.