Special Issue of 'Transport Policy'

"Understanding behavioural change: An international perspective on sustainable travel behaviours and their motivations"

Selected Papers from the 12th World Conference on Transport Research <u>http://dx.doi.org/10.1016/j.tranpol.2013.02.003</u>

Guest Editors: Eran Ben-Elia and Yoram Shiftan

Editorial

In an era of international fiscal austerity and global environmental threats there is a growing urgency for improved understanding of how to encourage more sustainable travel behaviours worldwide, particularly in and around cities. By 2050, the world population is expected to increase from 7.0 billion to 9.3 billion. At the same time, the population living in urban areas is projected to grow from 3.6 billion to 6.3 billion. Thus, the urban areas of the world are expected to absorb all the population growth expected over the next four decades while at the same time drawing in some of the rural population (United Nations, 2011). Problems related to urban mobility have, for decades, been a major concern for citizens and policy makers. Despite some attempts for restraint, cars continue to be the most popular mode of travel in developed countries given their door-to-door flexibility, , comfort, privacy, and multi-functionality. In developing countries the increase in car use and car ownership have been rapidly catching up with the developed world especially in Latin America, India and China (Dargay et al., 2010). Consequently, traffic congestion on urban roads has become a common scene all over the world.

Surface transport is an essential service in any modern society. Goods transportation ensures that products can be shipped from factories to markets. Passenger transport, both private and public, allows people to visit each other, go to work or school, and participate in a myriad of economic and social activities. An efficient transport system is often a major precondition for economic growth, competitiveness and employment. Transport is therefore fundamental to human society and economy and insuring proper mobility is vital for the competitiveness of markets and wellbeing of citizens. However, transport is also a main contributor to environmental problems such as deteriorating air-quality, noise and not less important CO₂ emissions. In the 2011 white paper on transport policy the European Commission highlighted that urban transport accounts for 40% of CO₂ emissions of road transport and approximately 70% of other pollutants from transport (European Commission, 2011). Increasing use of cars for everyday mobility has also been associated with health degradation in western countries (Schnohr et al., 2006). Evidently, there is need for better public policies to contend with the wide-spread dependency on the car in everyday life.

As a generally available public good, transport is limited by its throughput capacity. Hence historically, the focus of transport policy in developed countries was on transportation supply and demand management mostly aimed at mitigating traffic congestion (Shiftan and Golani, 2005) and improving flow within existing capacities. Despite some areas of success (e.g. in amending planning codes for new developments and improving public transport) these policies have only

managed to slow the rate of car trip and distance travelled increase, but not completely reverse these trends. People drive not just to work but to shopping, to school, to sports, to visit family and friends, and so on while the available evidence suggests that a notable share of driving is by choice (Handy et al., 2005). Compact development, higher parking fees and fuel costs have made car use less attractive, particularly in Europe, though still relatively wide spread. There are some who claim that in recent years we are beginning to see, in the West, a start of a possible reverse trend in car-use known as 'peak-car' related to economic hardships, changes in residence locations and rapid proliferation of information and communication technologies like high-speed internet and smart mobile phones (Puentes and Tomer, 2009). However, this would still need to be seen over a longer time horizon before it can be empirically verified.

It has also become apparent that travel behaviours are strongly associated with personal choice, social lifestyles and urban contexts. A result of complex interactions between attitudes, perceptions, information, and knowledge, interpersonal relationships and social norms (Steg, 2005), and external physical circumstances related to urban form (Schwanen and Mokhtarian, 2005; Mokhtarian and Cao, 2008; Shiftan and Barlach, 2002). This makes changing to more sustainable travel behaviours challenging. Thus it is clear that for policies to be successful in reducing car use, these interactions must be better understood and accounted for in policy formulation. As these studies have been conducted almost entirely in developed countries there is still a wide gap in the state-of-the-art regarding the trends and behaviours in developing countries.

The World Conference on Transportation Research (WCTR) aims to provide a venue for presenting transportation research from various regions and countries with particular emphasis on presenting research conducted in developing countries. In this ensemble of eight selected papers from the Activity and Transport Demand Analysis track of the 12th WCTR hosted in Lisbon in July 2010, we present an international collage of papers on understandings sustainable travel behaviour motivations from different geographical contexts and social backgrounds. A broad range of policies and behavioural aspects are covered including: push and pull measures, as well as soft policies; policies targeting the general population compared to children and adolescents; Different trip types such as service trips and recreation trips; and various travel modes including cycling.

Pricing road use through congestion charges and tolls has been perhaps the most debatable 'push' policy to decrease traffic congestion and a favourite among transport economists (Rouwendal and Verhoef, 2006). Road pricing is also advocated in almost every European Commission policy paper on transport as key corner stone in achieving well-balanced and sustainable transportation. Optimal first-best pricing involves variable charges on all road-users, routes and times of day, covering all the congested transport alternatives (Small and Verhoef, 2007). So far, technical complexity and unpopularity have only allowed implementation of second-best pricing schemes, that charge only a limited part of the transport system e.g. Singapore, London, Germany (lorries) and Stockholm (Verhoef et al., 2008). As pricing is perceived as an unfair policy (Eriksson et al, 2006) positive incentives or rewards have been considered as a possible 'pull' approach to encourage people to travel more sustainably and as means to change habituate behaviour (Bamberg and Schmidt, 2003). Recently, a pilot scheme for rewarding peak-avoidance, later expanded as a national policy has been tried out in the Netherlands as a substitute to an initially

considered universal pricing scheme (Ben-Elia and Ettema, 2011; 2009). In the 1st paper of this special issue Tillema, Ben-Elia, Ettema, and Van Delden compare effectiveness of the Dutch reward pilot scheme to the abandoned universal charging scheme. They reveal that as behavioural theory suggests, rewarding is more effective in motivating change. However, the change is mostly from car use at peak to off-peak times while mode changes are relatively limited.

With the proliferation of information communication technologies like mobile phones and internet, providing better travel information to people has been included in the debate on sustainability. Information is helpful for people to adapt to new travel contexts and to contend with unreliable travel times (Avineri and Prashker, 2006; Chrous et al., 2006; Ben-Elia and Shiftan, 2010, Shiftan et al., 2011). 'Soft travel demand management programmes have been taking place with the aim to give people personalized information regarding the possible travel alternatives available to them in order to encourage them to travel sustainably (Friman et al., 2012). In the 2nd paper of this issue Zhang, Stopher, and Halling describe results from the "TravelSmart" Households programme which was implemented in Adelaide, South Australia. They evaluate to what extent this project impacted the community's attitudes and beliefs with respect to travel behaviour change, comparing informed and non-informed inhabitants before and after the programme was implemented. They demonstrate that after exposure to personalised information, inadequate public transport was mentioned as a barrier to change despite the fact that overall willingness to reduce car use increased. These findings have important policy implications for implementing 'soft' travel demand management programs in other urban regions which need to be backed up by suitable 'real' alternatives to the car.

Balanced modal usage is an important aspect of sustainable transportation policy. Shorter distances make cities more adaptable to cycling and walking (Pucher and Buehler, 2008). There has been considerable discussion about policies to encourage cycling as a sustainable mode of urban travel substituting car travel for short range trips, mainly commuting to work (Heinen et al., 2010) and as co-modal with public transport (Martens, 2007). However, less is known about the needs of recreation cyclists. Recreation cycling is seen as important for direct health benefits and for indirectly influencing adoption of healthier lifestyles in general (Rissel and Garrard, 2006). In the 3rd paper of this issue Ching-Fu and Pei-Chun examine the needs and preferences of travellers for recreational cycling in Taiwan. They demonstrate that attractive facilities in tourist destinations increase the likelihood of cycling for the purpose of recreation.

Improving public transport has long been argued as an alternative to car use in many western countries and substantial funds spent on improving both quantity and quality of bus and rail services (Chapman, 2007; Banister, 2008; Sharaby and Shiftan, 2012). Attitude about the quality of public transport services is a key issue on the perception of users' satisfaction and actual use (Friman and Fellesson, 2009; Shiftan et. al., 2008). However, in developing countries, most trips are already conducted by public transport, but many services are informal and unregulated and often compete sometimes aggressively against the better organized and safer formal public transport modes (Cervero and Golub, 2007). These informal modes often clog city centres generating congestion and causing severe environmental problems as well as safety hazards. Here the term 'sustainable' does not imply necessarily the discouraging car use, but rather regulation of

public transport. However, there is limited knowledge in the motivations of mostly low-income travellers in using informal travel modes. In the 4th paper in this issue Guillen, Ishida and Okamoto demonstrate how (mis)perceptions and habitual behaviour regarding public transport dependency, as well as community norms, affect the choice of mode, specifically between informal tricycles and motorcycle taxis and formal busses in the Philippines. Their findings reveal that local knowledge on habitual behaviours is necessary before suggesting specific policy or planning interventions in cities of developing nations.

Car dependency is not only related to the travel choices of individuals and households but also to the travel behaviour of firms and businesses. The role of employers in influencing the travel choices of their employees through dedicated travel plans has been documented (Enoch, and Potter, 2003). Freight traffic and their associated logistic centres for commodity and goods transport have significant impact on congestion and the environment (Wagner, 2010; Browne, 2012) while there have been considerable advances in modelling freight traffic (de Jong, in press). Notwithstanding, there has been less attention to study the travel behaviour of service firms. In the 5th paper of this issue Hebes, Menge and Lenz use two different empirical datasets from Germany to reveal crucial predictors (internal structure, internal process and external structure factors) which provide valuable insights into the entrepreneurial impacts on service firms' travel patterns. These insights are extremely relevant as they show that car-favourable fiscal policies and misunderstanding service logistics can work against the goals of sustainability policies.

Urban form has been the focus of much debate in relation to encouraging sustainable travel (Banister, 2008) in particular to observed differences in travel patterns of suburban and traditional neighbourhoods. This lead urban planners to advocate the need to (re)design urban environments in a way that induces sustainable travel choices (Crane and Scweitzer, 2003) e.g. by planning denser land use development around public transport infrastructure (Curtis et al. 2009). However, there is disagreement if observed differences are related to the built environment or to self-selection of inhabitants who prefer neo-traditional neighbourhoods over suburban ones (Cao et al., 2009). Recent research has revealed that spatial (mis)perceptions in addition to physical contexts are associated with different travel patterns (Van Acker and Witlox, 2010). In the 6th papr of this issue Aditjandra, Cao, Mulley and Nelson present evidence from the UK regarding the impact of neighbourhood design (traditional vs. suburban design) on travel behaviour. They show that socio-economic variables as well as travel attitudes and neighbourhood design preferences together explain the differences in travel patterns. Moreover, land-use planning policy designed to accommodate low-carbon-based travel neighbourhood characteristics will likely have greater impact on the traditional compared to the suburban designed neighbourhoods.

Sustainability is clearly linked to long term education and future generations' lifestyles. In the last decades, there has been an increase in chauffeuring of children by car and a decline in children, as well as adolescents, walking and cycling in North America (Marzoughi, 2011). Examining the travel habits of the young is of importance to see what future behavioural trends will be like (McDonald et al., 2009). Moreover, it seems that where children and adolescents live also has an impact on how they travel as adults (Susilo and Waygood, 2012). In the 7th paper of this issue Mackett examines the nature of British children's travel behaviour, and the implications of this for the

extent of physical activity and so for their health. He considers the nature of children's travel and how it differs from that of adults and the effects of increasing physical separation of home and school on children's independent mobility. In the 8th paper, Goeverden and de Boer present a fascinating comparison of school travel in two Low-Land countries that have been well associated with cycling – Netherlands and Belgium (Flanders). Focusing on primary and secondary schools, they show that increasing distances between school and home decrease the propensity of cycling to school. However there are also distinct culture differences between the different societies which magnify income and gender differences. These are important issues for consideration in formulating effective policies to motivate healthier travel behaviours for the next generation.

We would like to thank all the authors who have contributed to the contents of this special issue. Special thanks also to the team of dedicated reviewers who have assisted the authors in improving the original papers. We would also like to thank the journal's special issues editor Agachai Sumalee for his cooperation, advice and assistance in completing this issue. Lastly, thanks to Anthony May, the president of the World Conference on Transportation Research Society (WCTRS), and Eddy Van de Voorde, the WCTR vice president for publication who gave us the push to start this project.

We hope you will find the issue informative and of interest.

Eran Ben-Elia and Yoram Shiftan

Guest Editors.

References

Avineri, E., & Prashker, J. N. (2006). The impact of travel time information on travelers' learning under uncertainty. Transportation, 33(4), 393-408.

Bamberg, S., & Schmidt, P. (2003). Incentives, morality, or habit? Predicting students' car use for university routes with the models of Ajzen, Schwartz, and Triandis. *Environment and behavior*, *35*(2), 264-285.

Banister, D. (2008). The sustainable mobility paradigm. Transport policy, 15(2), 73-80.

Ben-Elia E., Ettema, D. (2011b), Changing commuter behavior using rewards for avoiding rush-hour driving, Transportation Research-F, 14, 354-368.

Ben-Elia, E., Ettema, D. (2009), "Carrots versus sticks: Rewarding commuters for avoiding the rushhour - a study of willingness to participate." Transport Policy, 16, 68-76.

Ben-Elia, E., & Shiftan, Y. (2010). Which road do I take? A learning-based model of route-choice behavior with real-time information. Transportation Research Part A: Policy and Practice, 44(4), 249-264.

Browne, M., Allen, J., Nemoto, T., Patier, D., & Visser, J. (2012). Reducing Social and Environmental Impacts of Urban Freight Transport: A Review of Some Major Cities. Procedia-Social and Behavioral Sciences, 39, 19-33.

Cao X., Mokhtarian, P. L., & Handy, S. L. (2009). Examining the impacts of residential self-selection on travel behaviour: a focus on empirical findings. Transport Reviews, 29(3), 359-395.

Cervero, R., & Golub, A. (2007). Informal transport: A global perspective. *Transport Policy*, *14*(6), 445-457.

Chapman, L. (2007). Transport and climate change: a review. Journal of transport geography, 15(5), 354-367.

Chorus, C. G., Molin, E. J., & Van Wee, B. (2006). Use and effects of Advanced Traveller Information Services (ATIS): a review of the literature. Transport Reviews, 26(2), 127-149.

Crane, R., & Scweitzer, L. A. (2003). Transport and sustainability: the role of the built environment. Built Environment, 29(3), 238-252.

Curtis, C., Renne, J. L., & Bertolini, L. (2009). Transit oriented development: making it happen. Ashgate Publishing Company.

Dargay, J. M., & Gately, D. (2010). World oil demand's shift toward faster growing and less price-responsive products and regions. *Energy Policy*, *38*(10), 6261-6277.

Enoch, M., & Potter, S. (2003). Encouraging the commercial sector to help employees to change their travel behaviour. Transport Policy, 10(1), 51-58.

Eriksson, L., Garvill, J. and Nordlund, A. M. (2006) Acceptability of travel demand management measures: The importance of problem awareness, personal norm, freedom, and fairness, Journal of Environmental Psychology, 26, pp. 15-26.

Friman, M., Larhult, L., & Gärling, T. (2012). An analysis of soft transport policy measures implemented in Sweden to reduce private car use. *Transportation*, 1-21.

Friman, M., & Fellesson, M. (2009). Service supply and customer satisfaction in public transportation: The quality paradox. Journal of Public Transportation, 12(4), 57-69.

Handy, S., Weston, L., & Mokhtarian, P. L. (2005). Driving by choice or necessity?. *Transportation Research Part A: Policy and Practice*, *39*(2), 183-203.

Heinen, E., van Wee, B., & Maat, K. (2010). Commuting by bicycle: an overview of the literature. *Transport Reviews*, *30*(1), 59-96.

de Jong, G., Vierth, I., Tavasszy, L., & Ben-Akiva, M. Recent developments in national and international freight transport models within Europe. Transportation, 1-25.

Martens, K. (2007). "Promoting bike-and-ride: the Dutch experience." Transportation Research Part A: Policy and Practice 41(4): 326-338.

Marzoughi, R. (2011). Teen travel in the Greater Toronto Area: A descriptive analysis of trends from 1986 to 2006 and the policy implications. *Transport Policy*, *18*(4), 623-630.

McDonald, N. C., & Aalborg, A. E. (2009). Why parents drive children to school: implications for Safe Routes to School programs. *Journal of the American Planning Association*, *75*(3), 331-342.

Mokhtarian, P. L., & Cao, X. (2008). Examining the impacts of residential self-selection on travel behavior: A focus on methodologies. *Transportation Research Part B: Methodological*, *42*(3), 204-228.

Puentes, R. and Tomer, A. (2009) The Road Less Travelled: An Analysis of Vehicle

Miles Traveled Trends in the U.S. Metropolitan Infrastructure Initiatives Series,

Brookings Institution, Washington DC.

Pucher, J. and Buehler, R. (2008) 'Making Cycling Irresistible: Lessons from The Netherlands, Denmark and Germany', Transport Reviews, 28:4, 495 — 528

Rissel, C., & Garrard, J. (2006). Cycling for active transport and recreation in Australia: status review and future directions. World transport policy & practice, 13(1).

Rouwendal, J., & Verhoef, E. T. (2006). Basic economic principles of road pricing: From theory to applications. *Transport Policy*, *13*(2), 106-114.

Sharaby, N., and Shiftan, Y., "The Impact of Fare Integration on Travel Behavior and Transit Ridership", Transport Policy, Vol. 21, pp. 63-70, 2012

Schnohr P, Lange P, Scharling H, Jensen JS. Eur J Cardiovasc Prev Rehabil. 2006 Apr;13(2):173-9. Long-term physical activity in leisure time and mortality from coronary heart disease, stroke, respiratory diseases, and cancer. The Copenhagen City Heart Study.

Schwanen, T., & Mokhtarian, P. L. (2005). What if you live in the wrong neighborhood? The impact of residential neighborhood type dissonance on distance traveled. *Transportation Research Part D: Transport and Environment*, *10*(2), 127-151.

Steg, L. (2005). Car use: lust and must. Instrumental, symbolic and affective motives for car use. *Transportation Research Part A: Policy and Practice*, *39*(2), 147-162.

Shiftan, Y., & Golani, A. (2005). Effect of auto restraint on travel behavior. *Transportation Research Record: Journal of the Transportation Research Board*, *1932*, 156-163.

Shiftan Y. & Barlach Y. (2002) "The Effect of Employment Site Characteristics on Commute Mode choice" Transportation Research Record, Journal of the Transportation Research Board. No. 1781, pp. 19-25.

Shiftan, Y., Bekhor, S., and Albert (2011) "Route Choice Behavior with Pre-Trip Travel Time Information", IET Intelligent Transportation Systems, Vol. 5, No. 3, pp. 183-189, 2011

Shiftan Y., Outwater, M.L., and Zhou, Y. "Transit Market Research Using Structural Equation Modeling and Attitudinal Market Segmentation". Transport Policy, Vol. 15, No. 3, pp. 186-195, 2008

Small, K. A. and Verhoef, E. T. (2007) The Economics of Urban Transportation (London: Routledge). Susilo, Y. O., & Waygood, E. O. D. (2012). A long term analysis of the mechanisms underlying children's activity-travel engagements in the Osaka metropolitan area. Journal of Transport Geography, 20(1), 41-50.

United Nations, Department of Economic and Social Affairs, Population Division: *World Urbanization Prospects, the 2011 Revision*: Highlights. New York, 2012

Van Acker, V., & Witlox, F. (2010). Car ownership as a mediating variable in car travel behaviour research using a structural equation modelling approach to identify its dual relationship. Journal of Transport Geography, 18(1), 65-74.

Verhoef, E., M. Bliemer, L. Steg and, Van Wee, B. (2008) Pricing in Road Transport: A Multi-Disciplinary Perspective (Cheltenham: Edward Elgar Publishing).

Wagner, T. (2010). Regional traffic impacts of logistics-related land use. Transport Policy, 17(4), 224-229.