Urban Transport IX Urban Transport and the Environment in the 21st Century



WIT Press publishes leading books in Science and Technology. Visit our website for new and current list of titles. www.witpress.com USA mirror site: www.witpressUSA.com

International Series on Advances in Transport

Objectives

The objective of this Series is to provide state-of-the-art information on all aspects of transport research and applications. This covers land, water and air systems with emphasis on multi-mode operation. The books in the Series deal with planning operation and management as well as engineering aspects of transport. Environmental topics and sustainability are an important part of the Series. City, national and international transport are covered and encompassing interdisciplinary aspects.

Transport strategies	Railway systems
Planning and funding	Water and sea transport
Transport and economic issues	Road transport
Operations and management	Urban transport systems
Private and public initiatives and policies	Terminal and interchanges
Regulation and standardisation	People movers
Transport and land use planning	Multi-mode systems
Sustainable transport	Traffic integration
Environmental issues	Infrastructure
Information technology and electronic aspects	Scheduling and traffic control
Multi-media and advanced training techniques	Vehicle technology
Management information systems	Safety and accident prevention
Human interface and decision support	Hazardous transport risk
Traveller psychology and behaviour	Hazardous remediation
Emerging technologies	Transport in extreme conditions
Transport and energy	Freight transport
Air transportation	

Associate Editors

E. Angelino A.R.P.A. Lombardia Italy

R.D. Bornstein San Jose State University USA

S. Clement Transport System Centre Australia

F.Filippi La Sapienza Italy

Y.Hayashi Nagoya University Japan

L. Int Panis VITO Expertise centrum IMS Belgium

C. Jefferson University of the West of England, Bristol UK

J.W.S. Longhurst University of the West of England, Bristol UK

L.Lundqvist Royal Institute of Technology Sweden **G. Mattrisch** DaimlerChryslerAG Germany

F.Robuste Universitat Politecnica de Catalunya Spain

G. Sciutto Universita degli Studi di Genova Italy

Q. Shen Massachusetts Institute of Technology USA

E. Taniguchi Kyoto University Japan

M.A.P. Taylor University of South Australia Australia

R. van der Heijden University of Nijmegen The Netherlands

R. van Duin Transport Policy & Logistics Org. The Netherlands

A. Yeh The University of Hong Kong China

International Series on Advances in Transport

Objectives

The objective of this Series is to provide state-of-the-art information on all aspects of transport research and applications. This covers land, water and air systems with emphasis on multi-mode operation. The books in the Series deal with planning operation and management as well as engineering aspects of transport. Environmental topics and sustainability are an important part of the Series. City, national and international transport are covered and encompassing interdisciplinary aspects.

Transport strategies	Railway systems
Planning and funding	Water and sea transport
Transport and economic issues	Road transport
Operations and management	Urban transport systems
Private and public initiatives and policies	Terminal and interchanges
Regulation and standardisation	People movers
Transport and land use planning	Multi-mode systems
Sustainable transport	Traffic integration
Environmental issues	Infrastructure
Information technology and electronic aspects	Scheduling and traffic control
Multi-media and advanced training techniques	Vehicle technology
Management information systems	Safety and accident prevention
Human interface and decision support	Hazardous transport risk
Traveller psychology and behaviour	Hazardous remediation
Emerging technologies	Transport in extreme conditions
Transport and energy	Freight transport
Air transportation	

Associate Editors

E. Angelino A.R.P.A. Lombardia Italy

R.D. Bornstein San Jose State University USA

S. Clement Transport System Centre Australia

F.Filippi La Sapienza Italy

Y.Hayashi Nagoya University Japan

L. Int Panis VITO Expertise centrum IMS Belgium

C. Jefferson University of the West of England, Bristol UK

J.W.S. Longhurst University of the West of England, Bristol UK

L.Lundqvist Royal Institute of Technology Sweden **G. Mattrisch** DaimlerChryslerAG Germany

F.Robuste Universitat Politecnica de Catalunya Spain

G. Sciutto Universita degli Studi di Genova Italy

Q. Shen Massachusetts Institute of Technology USA

E. Taniguchi Kyoto University Japan

M.A.P. Taylor University of South Australia Australia

R. van der Heijden University of Nijmegen The Netherlands

R. van Duin Transport Policy & Logistics Org. The Netherlands

A. Yeh The University of Hong Kong China

NINTH INTERNATIONAL CONFERENCE ON URBAN TRANSPORT AND THE ENVIRONMENT IN THE 21ST CENTURY

URBAN TRANSPORT IX

CONFERENCE CHAIRMEN

L.J. Sucharov Wessex Institute of Technology, UK.

C.A. Brebbia

Wessex Institute of Technology, UK.

INTERNATIONAL SCIENTIFIC ADVISORY COMMITTEE

E. Angelino J.M. Baldasano J.G. Bartzis F. Benitez R.D. Bornstein C. Borrego H-C. Chin S. Clement K.G. Goulias G. Ibarra-Berastegi L.L.R. Int Panis C.M. Jefferson J.W.S Longhurst G. Mattrisch J. Mertner K. Miyamoto F. Patania P.S. Rana M. Reneland G. Sciutto E. Taniguchi M.A.P. Taylor R.Van der Heijden J.H.R. Van Duin A. Yeh

Organised by: *Wessex Institute of Technology, UK.*

Urban Transport IX Urban Transport and the Environment in the 21st Century

Edited by

L.J. Sucharov *Wessex Institute of Technology, UK.*

C.A. Brebbia *Wessex Institute of Technology, UK.*



L.J. Sucharov *Wessex Institute of Technology, UK.*

C.A. Brebbia *Wessex Institute of Technology, UK.*

Published by

WIT Press

Ashurst Lodge, Ashurst, Southampton, SO40 7AA, UK Tel: 44 (0) 238 029 3223; Fax: 44 (0) 238 029 2853 E-Mail: witpress@witpress.com http://www.witpress.com

For USA, Canada and Mexico

Computational Mechanics Inc

25 Bridge Street, Billerica, MA 01821, USA Tel: 978 667 5841; Fax: 978 667 7582 E-Mail: info@compmech.com US site: http://www.compmech.com

British Library Cataloguing-in-Publication Data

A Catalogue record for this book is available from the British Library

ISBN: 1-85312-961-5 ISSN: 1462-608X

> The texts of the papers in this volume were set individually by the authors or under their supervision. Only minor corrections to the text may have been carried out by the publisher.

No responsibility is assumed by the Publisher, the Editors and Authors for any injury and/or damage to persons or property as a matter of products liability, negligence or otherwise, or from any use or operation of any methods, products, instructions or ideas contained in the material herein.

© WIT Press 2003.

Printed in Great Britain by Bookcraft Ltd, Bath.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the Publisher.

PREFACE

There is an increasing focus today on the sustainability of the quality of life in our cities which involves many aspects such as land-use, recreation, services and notably urban transport. This is, in fact, the subject of a sister conference called The Sustainable City which takes place in May 2004 in Siena. Urban transport plays an essential part in the concept due to its linking and interaction with work, residential and service areas, and has an important bearing on air quality, safety, and social aspects. In fact urban transport may well be regarded as the nucleus for sustainable city planning. The study of urban transport itself is complex and involves many separate disciplines as shown by the variety of papers in the book. These cover transport systems, traffic integration, simulation systems, air pollution, noise pollution, accessibility and mobility, cost and investment, infrastructure, rail and road vehicles.

It is clear that there is unlikely to be one panacea for urban transport or for the fabric of our cities in any particular circumstance, and this is perhaps fortunate as variety itself provides a special interest to the quality of life. At the same time, the backdrop to urban transport research which this conference series has documented over nine years, is one of a serious shortfall in many of our cities in coping with the pressures of transportation and the ramifications for their inhabitants. This conference provides the latest research and proposes solutions but it is important that planners and city authorities are aware of such work in providing sustainable urban transport for their communities.

Special thanks are due to all contributors and in particular to members of the International Scientific Advisory Committee for their time and expertise in reviewing the abstracts and papers. We very much look forward to meeting all delegates at our ninth Conference in Crete.

The Editors March 2003

CONTENTS

Preface vi
Section 1: Transport Systems
Using strategic niche management to evaluate and implement urban transport policy instruments <i>P. Ieromonachou, S. Potter & M.P. Enoch</i>
Urban planning, transport planning and the environment: towards new policy in the Netherlands <i>J. Baggen</i>
The role of a feasibility study in planning a new LRT system <i>E. Matsoukis</i>
The revival of water-borne transport J.H.D. Luiting Maten, B.A. Pielage & J.C. Rijsenbrij
Predicting P&R use: an application of HII for mode choice modelling <i>D.M. Bos, E.J.E. Molin, R.E.C.M. van der Heijden & H.J.P. Timmermans</i> 43
Multi-fleet management system for public transportation companies by road in the Barcelona metropolitan area. Multimode information manager assistant for interchange transportation modes <i>E. Blasco, A. March & A. García</i>
The demand responsive transport services: Italian approach <i>C. Bellini, G. Dellepiane & C. Quaglierini</i>
Freight villages and comparable initiatives: relevance for urban transport <i>J. Vleugel</i> 73
Section 2: Traffic Integration
Nottingham ring road integrated major scheme J. Ojeil & P. Smith

vii

Structure and effectiveness analysis of an integrated traffic supervisory system <i>Y.E. Hawas</i>
Towards an integrated public transport system D. Allopi
Evaluation of the impact of new developments in traffic congested urban areas <i>G. Mintsis, C. Taxiltaris & S. Basbas</i>
To what extent does urban density influence the modal split? The Lisbon metropolitan area case study <i>F. Nunes da Silva & J. de Abreu e Silva</i>
The "spatial capacity" approach for a sustainable urban transport planning. The case of Kallithea/Athens <i>Th. Vlastos, N. Barbopoulos & D. Milakis</i>
Physical and environmental characteristics of signalized intersections and pedestrian behavior J.P. Thouez, D. Lord, J. Bergeron, R. Bourbeau, Y. Bussière, H. Bélanger-Bonneau, A. Rannou & M.E. Latremouille
Section 3: Simulation Systems
Adaptive controllers for vehicle velocity control for microscopic traffic simulation models <i>Y. Papelis, O. Ahmad & H. German</i>
Hybrid-series vehicle mathematical simulation model A. Pini Prato, M. Repetto & G. Vandelli
A behavioural model for the modal choice in the trip-chains D.C. Festa, D. Condino & G. Mazzulla171
Determining the start time of an incident from real time sensors A. Hobeika
Transportation safety research applications utilizing high-fidelity driving simulation <i>G.S. Watson, Y.E. Papelis & L.D. Chen</i>
Sustainable urban transportation development: a modelling approach <i>M.F.A.M. van Maarseveen & M.H.P. Zuidgeest</i>

Travel demand forecasting and TDM measures: the example of Montreal's south shore, 2001—2021 Y. Bussière, P. Lewis, MH. Vandersmissen & PY. Villeneuve
Environmental rating for passenger cars: Methodology options and applications in environmental policy L. Govaerts
Section 4: Air Pollution
Short-term forecasting of ozone and NO ₂ levels using traffic data in Bilbao (Spain) <i>G. Ibarra-Berastegi, I. Madariaga, E. Agirre & J. Uria</i> 235
Air pollution impacts of inland shipping: two case studies L. Int Panis, I. De Vlieger, B. Jansen, R. Torfs, E. Cornelis & L. De Nocker
Air pollution and urban plane of road traffic: experimental research about situations of environmental health hazard <i>F. Patania, A. Gagliano & F. Nocera</i>
The application of scientific uncertainty and error in the designated AQMAs of GB: implications for further air quality assessments <i>N.K. Woodfield, J.W.S. Longhurst, C.I. Beattie & D.P.H. Laxen</i>
The impact of road pricing and wind fields on vehicular air pollution Y. Tsubota & H. Kawashima
The sensitivity of air pollution to the structure and design of cities <i>J.M. Peters & A.P. Jones</i>
Exhaust emissions in residential areas with different street network configurations <i>L. Smidfelt Rosqvist</i>
Electric car: a tool to reduce environmental impact. To purchase or to share it? P. Zito, S. Salerno, M. Migliore & S. Amoroso
Impacts of vehicle emissions on vegetation T.W. Ashenden, M. Ashmore, J.N.B. Bell, K. Bignal, J. Binnie, J.N. Cape, S.J.M. Caporn, J. Carroll, A. Davison, P Hadfield, S. Honour, K. Lawton, S. Moore, S. Power & C. Shields

Automotive air pollution in Poznan from benzene: sources and reduction measures
M. Kozak & J. Merkisz
Transport and carbon dioxide emission: the Brazilian case S.K. Ribeiro, M.V. Real & M.A. D'Agosto
Cost effective containment of polluted canal sediments under roadway pavement <i>K. Wadeer, F. Scerbo, R. Kumapley, S. Burrowes & S. Manera</i>
On the exposure of bus drivers to organic volatile compounds at Guadalajara City, Mexico
E. Ortiz, P. Olaya, E. Alemón & J.M. Herrera
Hybrid drive line for urban solid waste collection and compaction A. Pini Prato, M. Repetto & G. Schiappacasse
Environmental impacts on soils from transport systems in various cities in Lithuania <i>P. Baltrenas & E. Kliaugiene</i>
Section 5: Noise Pollution
Road traffic noise exposure and myocardial infarction – a novel approach <i>G. Bluhm, M. Lindqvist & M. Rosenlund</i>
Planning, construction and experimental tuning of an urban railway noise cadaster
M. Presta & S. Ricci
The effect of tram track permanent way closure system on the level of noise <i>S. Lakusic, V. Dragcevic & T. Rukavina</i>
On the role of engine tribology in the reduction of noise and emissions A. Ruggiero & A. Senatore
Section 6: Accessibility and Mobility
A GIS-method to calculate accessibility by car, bus, cycle and foot <i>M. Reneland</i>
Travel behavior changes: evidence from a longitudinal travel survey <i>T. Kim & K.G. Goulias</i>

The implementation of alternative transit to preserve a region's cultural identity: a case study of Eagle County, Colorado, U.S.A.	
K.C. Cheung, F. Du, E. McMurray, K. Vora-Akhom & P. Campos	. 447
Planning for confronting transport demand due to special events: the case of the world exposition in the Thessaloniki Greater Area <i>G. Mintsis, C. Taxiltaris & S. Basbas</i>	453
The method of policy capturing for the transportation disadvantaged: simulation results <i>Y. Duvarci & G. Gür</i>	463
	105
The diminishing market for local food stores: A case for collective action? <i>T. Svensson</i>	481
Metropolitan dynamics, travel behaviour and the importance of new urban policies to achieve sustainable mobility: a local perspective <i>L. Breda-Vázquez & P. Ribeiro-Ramos</i>	491
Section 7: Cost and Investment Assessment	
Estimating benefits of travel demand management measures E. Taniguchi & H. Hirao	505
The cost of traffic accidents in Singapore H.C. Chin	515
True cost of road travel	505
L.C. Wadhwa & S.C. Wirasinghe	525
Measurement of change of environmental load generated by car traffic on economic value	
A. Kondo, T. Fujisawa, T. Maeda, A. Yamamoto & Y. Enoki	535
Research on the model of curb parking planning based on minimum generalized cost	
P. Yu-long & Y. Zhong-liang	547
The methods to evaluate the social cost of urban transport: which are the most reliable?	
C. Pronello	555

Section 8: Infrastructure

Towards a new modelling approach for evaluating the capacity of new railway projects
J.H.R. van Duin & M.J. Oldenziel
Roads to the future – new concepts for road infrastructure M. Koeleman, A.C. Maagdenberg, J. van der Kooij, G.A. van Velzen, G.G. van Bochove, K.P. Wilms, R.W.M. Naus & S. Poot
Dynamic barrier used to solve a large construction dewatering problem <i>C.E. Holley, J.E. Ross & B.M. Ghadiali</i>
Multicriteria evaluation of transportation infrastructure projects: an application of PROMETHEE and GAIA methods <i>K. Anagnostopoulos, M. Giannopoulou & Y. Roukounis</i>
Environmental management during metro railway construction especially in highly polluted and densely populated city <i>M. Kumar</i>
Transportation urban planning in the city of Maputo, Mozambique M.G. Mendes de Araújo & I.M. Raimundo
Evaluation of the Florence highway widening plan by means of LCA approach <i>A. Corti & L. Lombardi</i>
Section 9: Rail and Road Vehicles
Ultra light rail as intermediate transport for the urban environment C. Jefferson, T. Griffin & J. Skinner
Life Cycle Costing applied to a railway design and maintenance: creating a dashboard for infrastructure performance planning <i>A. Zoeteman</i>
Light rail Maglev with superconductor materials: system design G. D'Ovidio, G. Lanzara, F. Crisi, A. Navarra & M. Villani
Unfare solutions: taxing vices to solve the transport crisis M.P. Enoch & S. Potter
Exploring the fuel cell car future: an integrated energy model at the city level <i>P. Caratti, A. Haurie, D. Pinelli & D.S. Zachary</i> 677

Sustainable development of public transport: Technical choice of different systems <i>A. Bottazzi</i>	687
Mass transit system (LRT) planning for urban commuters along a busiest corridor	
S. Anisuddin & N.V. Ramamurthy	697
Index of Authors	707