

Aura Reggiani · Laurie A. Schintler
Editors

Methods and Models in Transport and Telecommunications

Cross Atlantic Perspectives

With 46 Figures
and 33 Tables

 Springer

Contents

| | |
|---|------------|
| Preface | VII |
| Contents | IX |
| 1 Introduction: Cross Atlantic Perspectives in Methods and Models Analysing Transport and Telecommunications | 1 |
| Aura Reggiani and Laurie A. Schintler | |
| 1.1 Prologue | 1 |
| 1.2 Towards Sustainable Transport: The STELLA-STAR Network..... | 2 |
| 1.3 Method and Models in Transport and Communications: Cross-Atlantic Paths and Reflections..... | 4 |
| 2 Transportation, Communication and Sustainability: In Search of a Pathway to Comparative Research | 9 |
| William R. Black and Peter Nijkamp | |
| 2.1 Transportation, Mobility and Communication | 9 |
| 2.2 Transport and Communication | 12 |
| 2.3 ICT and Sustainable Transport..... | 15 |
| 2.4 The Sustainability of ICT and Transport..... | 16 |
| 2.5 Similarities and Differences in Transportation and Communication: Toward a Transatlantic Comparative Perspective | 19 |
| 2.6 Prospect for a Research Agenda..... | 21 |
| Part A: Traffic Forecasting and Transport Network Analysis | |
| 3 Urban Travel Forecasting in the USA and UK | 25 |
| David E. Boyce and Huw C.W.L. Williams | |
| 3.1 Introduction | 25 |
| 3.2 Specification, Estimation and Solution Methods for Integrated Equilibrium Models..... | 26 |
| 3.3 Specification, Estimation and Solution Methods for Microanalytic Models | 29 |
| 3.4 States of Practice in the USA | 32 |
| 3.5 States of Practice in the UK..... | 34 |
| 3.6 Assessment of Progress, Problems and Prospects | 36 |

| | | |
|----------|--|-----------|
| 3.7 | Conclusions | 40 |
| 4 | Towards Developing a Travel Time Forecasting Model for Location-Based Services: A Review | 45 |
| | Jinsoo You and Tschangho John Kim | |
| 4.1 | Introduction | 45 |
| 4.2 | What Is LBS? | 46 |
| 4.3 | Travel Time Forecasting in ITS | 48 |
| 4.4 | Existing Travel Time Forecasting Models | 49 |
| 4.5 | A Comparison of Existing Travel Time Forecasting Models | 54 |
| 4.6 | Potential Roles of GIS in Travel Time Forecasting for LBS | 57 |
| 4.7 | Summary | 58 |
| 5 | Transportation Networks, Case-Based Reasoning and Traffic Collision Analysis: A Methodology for the 21st Century | 63 |
| | Kaidong Li and Nigel M. Waters | |
| 5.1 | Introduction | 63 |
| 5.2 | Applications of GIS in Traffic Safety Analysis | 64 |
| 5.3 | Applications of Case-Based Reasoning in Traffic Safety Analysis | 67 |
| 5.4 | Integrating Case-Based Reasoning and Geographic Information Systems | 71 |
| 5.5 | A Case Study: Integrating GIS Network and CBR Approaches for Traffic Safety | 73 |
| 6 | A Sketch and Simulation of an Integrated Modelling Framework for the Study of Interdependent Infrastructure-Based Networked Systems | 93 |
| | Kieran P. Donaghy, Jose F. Vial, Geoffrey J.D. Hewings and Nazmiye Balta | |
| 6.1 | Introduction | 93 |
| 6.2 | Interdependent Networks in the Regional Economy of the Midwest United States | 95 |
| 6.3 | Static Equilibrium Interdependent Network Models | 98 |
| 6.4 | Numerical Simulations with a Stylized Integrated Model of Interdependent Networks | 105 |
| 6.5 | From Statics to Dynamics | 109 |
| 6.6 | Conclusions | 112 |
| | Appendix 6.A: A Stylized Integrated Model of Interdependent Networks | 114 |
| | Appendix 6.B: Deriving Updated Estimates of Interregional Inter-Industry Sales Coefficients in a Regional Econometric Input-Output Model | 117 |

Part B: Freight Transport

| | | |
|-----------|---|------------|
| 7 | Can Freight Transport Models Be Transferred Across the Atlantic? | 121 |
| | Kenneth Button | |
| | 7.1 Introduction | 121 |
| | 7.2 The Background to Modern Freight Models | 123 |
| | 7.3 Meta Analysis | 126 |
| | 7.4 Transferability | 128 |
| | 7.5 Types of Model | 130 |
| | 7.6 Differences Between the US and Europe | 134 |
| | 7.7 Conclusions | 138 |
| 8 | Dynamic Game-Theoretic Models of Urban Freight: Formulation and Solution Approach | 143 |
| | Terry L. Friesz and Jose Holguín-Veras | |
| | 8.1 Introduction | 143 |
| | 8.2 Background | 145 |
| | 8.3 Obtaining a Dynamic Urban Freight Trip Table | 150 |
| | 8.4 A Dynamic Carriers' Model for Urban Freight..... | 155 |
| | 8.5 Post-Processing to Identify Carrier Routes | 158 |
| | 8.6 Algorithms for Dynamic Variational Inequalities | 158 |
| | 8.7 Future Research..... | 158 |
| 9 | A Multi-Criteria Methodology for Stated Preferences Among Freight Transport Alternatives | 163 |
| | Michel Beuthe, Christophe Bouffioux, Jan De Maeyer, Giovanna Santamaria, Marie Vandresse, Els Vandaele and Frank Witlox | |
| | 9.1 Introduction | 163 |
| | 9.2 The Questionnaire and Stated Preference Experiment | 164 |
| | 9.3 The UTA Model | 168 |
| | 9.4 Preliminary Results of the Multi-criteria Analysis | 173 |
| | 9.5 Conclusion..... | 177 |
| 10 | An Adaptive Conjoint Analysis of Freight Service Alternatives: Evaluating the Maritime Option | 181 |
| | Angela Stefania Bergantino and Simona Bolis | |
| | 10.1 Introduction | 181 |
| | 10.2 Data Base Construction Methodology..... | 182 |
| | 10.3 Data Analysis and Estimation Methodology | 188 |
| | 10.4 Concluding Remarks | 194 |

Part C: Telecommunications and Air Transport

| | | |
|-----------|--|------------|
| 11 | Small-World Phenomena in Communications Networks: A Cross-Atlantic Comparison | 201 |
| | Laurie A. Schintler, Sean P. Gorman, Aura Reggiani, Roberto Patuelli and Peter Nijkamp | |
| | 11.1 Introduction | 201 |
| | 11.2 Small-World Network Analysis | 202 |
| | 11.3 Empirical Experiments | 206 |
| | 11.4 Conclusions: Towards a Cross-Atlantic Agenda..... | 217 |
| | Appendix 11.A | 220 |
| 12 | The Diffusion of Cellular Phones: A Model for Italy and a Comparison with the United States | 221 |
| | Domenico Campisi, Roberta Costa and Carlo Tesauro | |
| | 12.1 Introduction | 221 |
| | 12.2 Model and Data | 222 |
| | 12.3 The Results | 225 |
| | 12.3 Conclusions | 225 |
| 13 | Congestion Charging at Airports: Dealing with an Inherent Complexity | 239 |
| | Milan Janic and Roger R. Stough | |
| | 13.1 Introduction | 239 |
| | 13.2 Demand Capacity and Congestion at European and U.S. Airports ... | 240 |
| | 13.3 Charging Congestion at Airports..... | 245 |
| | 13.4 Modelling Congestion Charging at an Airport | 248 |
| | 13.5 An Application of the Proposed Models | 256 |
| | 13.6 Conclusions | 264 |
| 14 | Short- and Long-Term Reaction of European Airlines to Exogenous Demand Shifts..... | 269 |
| | Marco Alderighi and Alessandro Cento | |
| | 14.1 Introduction | 269 |
| | 14.2 Exogenous Demand Shifts: The American and Asian Crises. | 272 |
| | 14.3 The Theoretical Model | 276 |
| | 14.4 The Empirical Analysis | 282 |
| | 14.5 Conclusions | 294 |

Part D: Sustainable Transport and Policy Perspectives

| | | |
|-----------|--|------------|
| 15 | Taxes and the Environmental Impact of Private Car Use: Evidence from 68 Cities..... | 299 |
| | Keiko Hirota And Jacques Poot | |
| | 15.1 Introduction..... | 299 |
| | 15.2 Previous Research and Theoretical Considerations..... | 301 |
| | 15.3 Data Description..... | 306 |
| | 15.4 Regression Results | 311 |
| | 15.5 Final Comments | 313 |
| | Appendix 15.A..... | 316 |
| 16 | European Perspectives on a New Fiscal Framework for Transport...319 | |
| | Stephen Potter, Graham Parkhurst And Ben Lane | |
| | 16.1 The Purposes of Taxation..... | 319 |
| | 16.2 Fiscal Measures to Promote Cleaner Cars..... | 320 |
| | 16.3 Eco-Reform or Eco-Transformation?..... | 327 |
| | 16.4 Conclusions | 332 |
| 17 | Time and Travel.....335 | |
| | David Banister | |
| | 17.1 Introduction..... | 361 |
| | 17.2 The Nature of Time..... | 362 |
| | 17.3 The Treatment of Time..... | 363 |
| | 17.4 Congestion Charging..... | 368 |
| | 17.5 Transport and ICT | 370 |
| | 17.6 Conclusion..... | 372 |
| | List of Contributors..... | 349 |
| | List of Referees | 355 |
| | Subject Index | 359 |