

Editorial

Special issue: Land Use Transport Interaction Modelling

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That land-use and transport systems are interdependent and characterized by a two-way interaction is a well-known fact. The spatial configuration of activities influences the level and characteristics of transportation demand, and conversely, the location and quality of transportation infrastructure affects how activities are organized in space. Since the 1960s, several methodologies and models have been developed and used to examine the land-use and transport patterns and change. The research issues addressed using these models have, since the 1990s, been broadened to include sustainability impacts in transport policy, thereby strongly increasing modelling demands and raising several research challenges. This was the theme of a special session on 'Land Use Transport Interaction Modelling and Sustainability', as part of the international conference 'Framing Land Use Dynamics' held in April 2003 at Utrecht University (UU) in the Netherlands. The conference was organised as part of the Utrecht University's multidisciplinary research programme, 'Networks in the Delta', aimed at developing a theoretical and methodological framework for understanding and modelling the complex interactions between socio-economic and environmental systems (see website *Networks in the Delta (2004)* for a full description). The papers included in this special issue of the European Journal of Transport and Infrastructure Research were presented at the conference under the theme, 'Infrastructure, mobility and land-use planning', focusing on transportation and land-use dynamics. Papers describe experiences with land-use and transport interaction models as impact assessment and policy appraisal tools, with contributions covering different local, regional and national spatial scales in Western European contexts, in particular, the United Kingdom, Germany and the Netherlands.

Klaus Spiekermann and Michael Wegener describe in their paper the methodology and model system developed in the EU research project PROPOLIS. In this project, operational urban

land-use/transport interaction models are used within a comprehensive evaluation framework to assess the urban sustainability impacts of land-use and transport strategies in European cities. A variety of indicators were computed to measure the three dimensions of sustainability – environmental, socio-cultural and economic. A number of policies were tested in seven urban regions in Europe; these included policies on land use, transport infrastructure, transport regulation and pricing, as well as combinations of these. A novelty of the model system is that it moved towards three-way land-use transport environment modelling, with raster-based impact models used to estimate environmental and social indicators at a high spatial resolution. The authors present the aggregate results of policy testing and the evaluation for the Dortmund urban region (one of the seven). Their conclusion is that only a few policies and policy combinations, all involving car-pricing scenarios, will be able to reverse a declining trend in both the environmental and social dimension of sustainability.

In his paper, David Simmonds draws upon his experience in a number of land-use transport interaction modelling studies related to strategic land-use/transport planning in the UK, all of which involved the DELTA land-use/economic modelling package linked to an appropriate transport model. Simmonds also illustrates the contribution of land-use interaction modelling to examining major land-use, transport and economic impacts that may arise from planning decisions; impacts may also reveal unexpected impacts when land use and transport plans are not properly integrated. For example, a substantial increase in economic activities in town/city centres may have a negative impact on total employment in the area, since businesses moving into these areas contribute to making congestion worse, thereby reducing the competitiveness of the area. In a more theoretical twist at the end of his paper, the author not only stresses the need to assess the user benefits of planning strategies on the basis of both the transport system and land-use related effects, but also discusses a framework for doing so.

Lynn Devereux, Ying Jin and Ian Elston describe the use of an integrated land-use and transport model in the development of a long-term strategy for sustainable transport in a large-scale corridor study, the London to Ipswich corridor in the United Kingdom. Here, the authors clearly make a case for including land-use and transport interactions in transport policy appraisal. Their first point is that land-use developments in the region contribute to longer average journey lengths and stronger travel demand growth. Secondly, they argue, in examining the transport demand of new high quality bus services in the corridor, a number of unexpected, underlying policy responses have been demonstrated. The bus services investigated would not primarily be used by targeted disadvantaged groups but most likely by a high-income group of commuters to London. These services would enable them to move further away from their workplace into more peripheral areas served by the new bus services. The authors conclude that future travel demand effects can not be separated from underlying land-use activity distribution, and that the effects of transport and land-use proposals will require full consideration of interactions.

Arnout Schoemakers and Toon van der Hoorn illustrate in their paper that land-use transport interaction models can play an important role in land-use and transport infrastructure planning processes. The authors start with a description of some of the trends in Dutch transport policy, referring to the period from the late 1980s up to the beginning of 2000, when sustainability was an important policy goal for both transport planning and spatial planning.

They then describe their experience with four applications of the Dutch TIGRIS model. Each of these was carried out as part of the preparation of policy decisions on regional infrastructure and urbanisation strategies. The authors conclude their experiences so far to be overwhelmingly positive, showing that experts on transport planning and land use have clearly come to see the interrelations between their respective fields. In none of the four applications, however, could the authors identify a direct influence of the model study on the outcome of the planning process. An inventory of the modelling requirements of client policy agencies suggested a number of possible improvements to the model, which has led to recommendations for a new policy-oriented LUTI model.

Thus, the applications of land-use transport interaction models described in this special issue demonstrate the contribution that such modelling can make to policy-making and sustainability appraisal. However, there are many outstanding research issues. Simmonds concludes that the process of bringing sustainability issues into land-use/transport policy appraisal will focus more on longer time horizons. This will increase demands on modelling, especially to take account of all the gradual feedback efforts that are only significant on the longer term.

Finally, Karst Geurs and Bert van Wee review the land-use/transport interaction models discussed in this special issue and present a framework for sustainability impact assessments of land-use and transport policy appraisal. Outstanding appraisal issues relate to the inclusion of wider (macro-)economic effects and non-use values, and to the generation of more knowledge for understanding ecological and social impacts, and the development of related indicators and methodologies to calculate them. A final challenge is related to the presentation and integration of sustainability impacts, not only including the economic, ecological and social impacts, but finding the 'right' balance between them.

Reference

Networks in the Delta (2004): *Networks in the Delta: Integrated Research Programme into the Dynamics and Management of Spatial Interactions between Socio-economic and Environmental Systems in Northwest Europe*. Website (<http://networks.geog.uu.nl>) last visited on June 14, 2004.