BUILDING BLOCKS FOR SUSTAINABLE TRANSPORT: OBSTACLES, TRENDS, SOLUTIONS

BUILDING BLOCKS FOR SUSTAINABLE TRANSPORT: OBSTACLES, TRENDS, SOLUTIONS

EDITED BY

ADRIAAN PERRELS

Government Institute for Economic Research
VATT, Helsinki, Finland

VELI HIMANEN

Relate Partnership, Inkoo, Finland

MARTIN LEE-GOSSELIN

Centre de Recherche en Aménagement et Développement,
Université Laval Québec, Québec, Canada

United Kingdom • North America • Japan
India • Malaysia • China

Emerald Group Publishing Limited
Howard House, Wagon Lane, Bingley BD16 1WA, UK

First edition 2008

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

ISBN: 978-0-85724-516-8

Photograph by Ken Coughlin: for the New Mobility Foundation, http://www.newmobility.org, Paris, France.

Acknowledgement

The foundation for this volume was laid during the project STELLA (Sustainable Transport in Europe and Links and Liaisons with America) funded by the European Commission (Contract GTC2-33019-2000). One of the so-called Focus Groups (no. 4) dealt with Environment, Safety, Health, Land Use and Congestion, in short: the external effects of transport. The Focus Group staged three seminars for which participants submitted papers. From the first two seminars papers selections were made, which — after review and revision — were published in special issues in scientific journals, being the European Journal of Transport and Infrastructure Research (2002, Vol. 2 No. 2/3) and the Journal of Transport Geography (2005, Vol. 13. No. 1). In addition the Focus Group co-chairs, Veli Himanen and Martin Lee-Gosselin, and the scientific secretary, Adriaan Perrels, produced a few overview papers, which were published in Transport Reviews (2004, Vol. 24, No. 6) and in the European Journal of Transport and Infrastructure Research (2006, Vol. 6, No. 1). This book started from a set of contributions of the third Focus Group meeting in 2004. During the process selected papers were reviewed and updated, while along the way some other papers were added.

We like to thank all the contributors of the three Focus Group meetings. The material of over 40 papers and the interventions of other participants during the meetings were of great value to shape our views of sustainable transport and of the research still needed to further the realisation of sustainable transport.

Adriaan Perrels
Veli Himanen
Martin Lee-Gosselin
Editors

Preface

It is clear that transport is an important element for the well-being of society. We need to get to work, to travel for business and pleasure and to deliver the products that in large measure determine our lifestyles. Efficient transport systems are essential for keeping economies competitive and improving the quality of life for communities and citizens.

The transport system is a very large and complex system, with global, continental, regional, national and local needs and networks connected to each other, and many separate decisions of individual actors with different goals influencing the nature of the system and its effects. There is a challenge to meet those needs and to find a balance between the benefits and negative effects of transport.

Our increasing demand for transport has created problems that threaten our mobility. Every day thousands of kilometres of European and North American highways are blocked by traffic jams. Congestion adds an extra bill to our economies. Every year over 40,000 people are killed and more than 1.7 million are injured in road fatalities in Europe, and remarkably similar totals are experienced in North America. Important environmental issues including climate change, noise, urban sprawl and land fragmentation are closely linked to traffic volumes. Future oil prices, global climate change and population demographics pose challenges which require mobility which is environmentally, socially and economically sustainable.

Many sectors of society, administrative systems and cultural traditions as well as lifestyles affect transport demand and solutions. That is perhaps one reason why there is no single interpretation of sustainable transport, in spite of the fact that political decisions and strategies have frequently noted that transport must be a key contributor to sustainable development.

Research in transport has a long and impressive history, particularly of course in transport engineering, including design and development of technologies and materials that have provided the vehicles, craft and networks that have allowed spectacular increases in mobility of people and goods over centuries. Transport economics, while a younger discipline, has a history of at least two centuries. In this time span it attempted to understand transport behaviour in many different ways and to design institutional settings for infrastructure and services that enable viable enterprises and create sufficient benefits to justify public expenditures. Recent decades have seen an enormous expansion of transport research and an evolution

into other branches of the physical and social sciences, with major contributions to understanding behaviour of individuals and companies, interactions between land use and transport, and systems of management and governance of all aspects of transport networks and services. Researchers in many different disciplines have become involved, and interactions among them have flourished. And relationships between researchers and government agencies have evolved, as the latter have sought greater insight into policy development and integration. The results of these interactions and relationships are evidenced in the increasing attempts of governments to apply policies based on sound research evidence and advice of researchers.

Within the community of researchers, the potential is still being developed, as researchers have recognised the possibilities for collaboration and integration of results. This volume presents the results of some of this collaboration, among researchers in Europe and North American, offering insights into the future of transport systems, and policies necessary to achieve sustainable development. Europe and America have many similarities in their societies; economic prosperity, good transport networks, strong car industries, extensive transport research. But they also have important differences, in the sharing of roles between the public and private sectors, in urban structure, and the shares of public and private transport modes. These similarities and differences provide fruitful grounds to share experiences, to learn from each other and find best practices and key elements for workable solutions for sustainable transport. Learning from each other and closer contacts between researchers and policymakers were the initial impetus behind the STELLA Transatlantic Thematic Network (Sustainable Transport in Europe and Links and Liaisons with America) for which the institutional framework was created by European Union funding. This book is based on that co-operative work of European and American researchers and policymakers. The results make it clear that this kind of co-operation should be encouraged to aid the development of integrated transport systems to meet future economic and social needs.

John Lawson, Ottawa
Raisa Valli, Helsinki

Chapter 1

Introduction

Adriaan Perrels, Veli Himanen and Martin Lee-Gosselin

1.1. Framing the Themes

Prior to the coining of the term 'sustainable transport', transport economists were commonly referring to the 'external effects' of transport. The latter concept is important as it is still the cornerstone of many policies and measures that deal with a particular external effect of transport, such as traffic noise or traffic collisions. However, on the basis of the sets of STELLA seminars and discussion papers that dealt with external effects of transport, and more generally with transport and sustainability, the editors took the view that the development of sustainable transport requires a more comprehensive theory, toolbox and policy design than the management of external effects. As a sustainable transport policy portfolio will still encompass the handling of external effects, but goes beyond it, we first introduce these external effects and subsequently make the step to sustainability requirements and their implications for the design of transport policies. The external effects have to do with interactions of the transport system with environment, safety, public health, land use and congestion. In all cases, except for land use and — under certain assumptions — congestion, the external effects are on balance negative, meaning that the causer of the effect does not pay (full) compensation to those who suffer from it, regardless of whether the sufferers are inside or outside the transport system.

In the case of land use both positive effects (accessibility) and negative effects (loss of functionality) occur and it depends on an intricate mix of factors whether on balance the contribution of transport for land use in a certain area (and time span) is positive or negative. The standard case is that better access has positive effects on land use, and hence on land value, because the number of alternatives for using the land is increasing. A highly accessible area will have high land values, and thereby a selection process has started that should weed out activities that have low productivity per unit of surface area. Furthermore, the consequently high densities

Building Blocks for Sustainable Transport

DOI:10.1016/B978-0-08044-709-4.00001-X

and intensive traffic will increase negative spillover effects, making it less functional for some types of activity. Nevertheless, congestion can still occur as an inherent rationing system for transport infrastructure. Congestion charges can diminish congestion and allocate access, notably to the most productive activities. Yet, the extent to which congestion charges actually raise welfare compared to untreated congestion depends on the induced effects of relocation of activities, and of the pass-through of congestion charges to the prices of products and services.

Improved access may have also negative effects at the other end of the spectrum, i.e. in areas with hitherto limited access and limited endogenous market potential. In these circumstances, improved access may result merely in increased export-oriented natural resource extraction and in outflow of labour force to the core area (notably the most talented). This special case is also known as the Voigt effect (Voigt, 1973) and re-introduced in the framework of core-periphery dynamics via the new economic geography literature (e.g. Fujita, Krugman, & Venables, 1999).

The emergence of negative impacts can be studied in the light of subsequently evolving transport problems (see also Dugonjic, Himanen, Nijkamp, & Padjen, 1993). For this purpose transport problems are subdivided into three categories, being *traditional*, *modern* and *post-modern*.

The traditional transport problem — how to get from one place to another — is related to the nature of human activities. The current-day solution for the traditional problem has been the provision of large-scale transport networks with huge volumes of circulating vehicles. This has resulted in the modern transport problem with a large number of accidents, and substantial but dispersed environmental impacts.

The post-modern transport problem can be characterised by two dimensions, namely: the rate of congestion and the degree of sustainability. In densely populated societies it is ever more difficult to provide new capacity for heavily used transport systems, i.e. current congestion cannot be alleviated by traditional means. The post-modern congestion problem can also be seen as a conflict between two countervailing demands: to provide a robust, predictable level of transport service and to provide unlimited access to activities and services whenever and wherever the 'customer' wants. At the same time, growing demands for sustainable development have expanded the scope of environmental impacts that are attributed to transport — from local nuisances or health and accident risks — to include global issues related to the future of the human condition. With respect to sustainability research has shed new light on some of the local impacts, such as the serious health effects of very small particles.

With the introduction of the term *sustainable transport* a new — post-modern — era of transport policy and its supporting research is entered. Sustainable transport is a more normative notion than the concept of external effect, which arose in connection to the so-called modern transport problem. Admittedly, in order to be able to agree on the existence of external effects one needs to agree on a vision how transport markets work and what market failures imply. Yet, over these issues a general consensus exists. The debates concern application details, such as about accurate compensation levels. Assessments of external effects and their 'optimal levels' also tend to be piecemeal (localised, by type of effect, etc.). Sustainability however is a comprehensive forward-looking concept aiming at the achievement of

an overall better state of the society. A 'better state of the society' means a better overall level of welfare for the society, while using a widened concept of welfare, including environmental quality and social justice, which can also be sustained for a long time. In other words, whereas dealing with external effects sort of implies that society satisfies itself with keeping nuisances at an acceptable level, sustainability suggests that we can be truly better off.

In this context it should be added that the adjective 'sustainable' is used in different ways. Strictly speaking a system can be termed 'sustainable' when it is in a *sustainable state*. However, in practice the term 'sustainable' is often used while meaning the promotion of a transition towards a sustainable state. So, a sustainable transport policy usually implies a policy package that — at least in some respects — furthers the objective of making transport sustainable, meaning that — *as yet* — the system is not sustainable. A second important difference with the concept of external effects is that sustainability implies not only accounting for social and environmental effects, but also for the economic sustainability of the system.

Sustainability

In public discourses 'sustainability' is often identified with the tensions between economic growth (i.e. the growth of material wealth) and the state of the environment. In this respect 'more sustainable' (than a previous policy) is often understood as ensuring that environmental qualities are maintained even if that would imply some reduction (in the increase) of material wealth. Sustainability has however three pillars, being the economic, the environmental and the social realm, respectively. Expansion in one realm should take care to respect minimum requirements with respect to the other realms. Furthermore, current use of natural and man-made resources should not lead to a decrease of welfare per capita of future generations. Last but not least, the existence of international markets for natural resource use and the occurrence of transboundary environmental problems, such as climate change, acid rain and biodiversity, imply that sustainability and sustainable development need a common understanding and policy framework at the global level.

Within and across disciplines there is a scientific debate going on about the minimum requirement levels for each of the realms. The discourse is often referred to as 'weak sustainability versus strong sustainability' (for an elaborate discussion of the discourse see e.g. Neumayer, 2003). Both sides agree that sustainability can be understood as the guideline that mankind should aim for a way of generating welfare for current generations which does not put at risk the possibilities of future generations to achieve at least the same welfare levels. Adherents of weak sustainability do think that virtually all economically exploited services and products from nature can be somehow substituted either within nature or with the aid of man-made goods and services. The implication of this assumption is that there are no physical constraints to ever expanding material wealth, even though there could be regarding the pace of increase of wealth. In contrast, those that adhere to strong sustainability think that the carrying capacity of ecological