Editorial: Identifying Building Blocks of Sustainable Transport – Lessons on External Effects from Both Sides of the Atlantic

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Introduction

Environmental and social impact assessment are default elements of transport policy preparation and transport project appraisal in many OECD countries. In the recent past however, it has been realised that such an approach does not suffice. Instead of representing possible limiting factors, the aims and principles of sustainable development are to be regarded as the very point of departure for formulating transport policies, as is for example formulated in the European Commission White Paper on Transport (COM, 2001). This has consequences not only for policy formulation, but also for theresearch that is used to build the evidence about the actual and potential impacts of transport systems.
The thematic network project STELLA (Sustainable Transport in Europe and Links and Liaisons with the Americas), financed by the EU, focuses on this policy reformulation challenge, and in particular the research needs that are connected to the reformulation. Essentially, the network has the following aims:

- to create an institutionalised platform for exchange of scientific information (in particular, research in progress), for pooling of (partly common, partly contrasting) experience and for facilitating research co-operation among European and North American transportation researchers and experts;
- to foster a better understanding of the (common and different) causes and backgrounds of mobility behaviour in both Europe and North America, particularly with a view to the impacts of policy (transportation policy, land use policy, environmental policy and economic policy);

- to foster and create conditions for applied comparative research in both Europe and North America regarding behavioural motives, innovative strategies and policy assessment in the transportation sector with a view to sustainable transport.

The network consists principally of five so-called Focus Groups, each covering a thematic area. One Focus Group, no.4, covers the area 'Environment, Safety, Health, Land Use and Congestion' in other words the external effects of transport. The five domains represent either sources or impacted areas of external effects. The external effects of congestion and safety have to do with effects that one agent in the transport market inflicts upon another. In other words they are external effects for the individual user, but operate within the transport system, althoughadmittedly accidents can also generate wider effects, and persistent congestion can also spill over to location choice and land use. On the other hand, impacts on the environment, land use and health refer predominantly to agents outside the transport system.

The backbone of the focus group work is made up from three annual seminars. The first seminar (2002) was intended as a scoping exercise leading to a list of most urgent topics and most promising approaches in research and policy-making. This list provides the basis for the second seminar (2003). The following papers in this special issue are a selection from the presentations at the first Focus Group 4 Seminar (3/4 May 2002, Helsinki) and have in common that they map out particular current and/or emerging policy problems, concepts, and modelling approaches with respect to the five sub-areas mentioned.

Sustainability and its relation to the five sub-areas

Sustainability is generally understood as a state of the economy and society in which the current level of resource use (natural and man-made) does not prevent future generations of mankind from enjoying at least the same level of well being as the current generation. Resource use and well being encompass ecological, economic, and social dimensions. The prevailing view is that the current functioning of societies around the world is not sustainable, with large variations between countries and sectors regarding the severity of conflict with sustainability principles. For transport the implications of adopting a transition towards a sustainable society are twofold:

the transport system itself has to become 'cleaner', sufficiently productive, and without socially adverse effects
the way the transport system functions and the alternatives it offers should enable (or at least not disable) other parts of society to remain within its trajectory towards sustainability

Whereas the first implication already describes a major challenge for the transportation system, the second one crucially extends and complicates the domain of co-ordination. The transportation system as such could be transformed into a sustainable one in various ways. It depends however on the societal and economic context (point 2) as to which of these alternatives are fitting into the overall system. Even in that case there is probably some leeway, but corrections to (apparently) unfit solutions may become more expensive in social, economic and ecological terms.

A major issue in the understanding of allowable solutions that promote sustainability is the difference between 'weak' and 'strong' sustainability (e.g. Neumayer, 1999). Weak

sustainability is based on the hypothesis that by and large increasing scarcity of any natural endowment (or its services) can be attenuated by means of substitution. Strong sustainability in contrast postulates that there are many natural endowments, or the services that they enable, that are both indispensable and without adequate substitutes. This means that strong sustainability will often call for absolute preservation, but is much less inclined to resort to substitution, as is the case for weak sustainability. Most probably, a sustainable society needs to apply both concepts depending on the issue under consideration. Furthermore, the mix of both concepts may even vary across countries and regions, depending on the volume and quality of the natural endowments as well as the social and economic trade-offs to be considered.

The tendency among policy makers to subscribe to either weak or strong sustainability directly affects the kind of approach policy makers will favour with respect to the external effects considered in STELLA Focus Group 4, except for congestion which can be regarded purely as an issue of economic scarcity. There is a growing consensus that those that use transport services – being either end-users or operators using infrastructure - should pay for the external effects that are caused by these services. The operationalisation of that concept is, however, only starting to unfold (see e.g. the results of EU project UNITE, inter alia Link et al, 2002). Adequate pricing of the effects requires adequate information regarding impact attribution and its representation in manageable and reliable indicators. The contributions to this volume of Bannister and Stead as well as of Black underline that there is development work ahead before such indicators are available.

Even if the principle of internalisation is accepted by policy makers and other interest groups, resulting surcharges per (marginal) transport service unit can differ substantially depending on the perception of what sustainability implies ('weak' or 'strong'). Strong sustainability will result in much higher surcharges in the short run owing to the bigger scarcity that is implied. The numerous exercises on possible prices for CO_2 emission permits demonstrate the price volatility in relation to market regulation assumptions[1] (e.g. Euroelectric, 2002; Point Carbon – Europe Weekly 24-1-2003). The more myopic that quasi-markets for internalised external effects are expected to be or prove to be, the more extensive is the need for the public intervention. This is particularly relevant for infrastructure and land use planning. The first Focus Group 4 seminar concluded that land use patterns and the land claims of infrastructure, together with the (environmental) sustainability challenge, are the key issues to be tackled. These two issues also precede and substantially influence the impact potential of the other external effects – health, safety and congestion.

Inter-relationships between the transport externalities

Beneath the inter-relatedness of the externalities looms the hard-to-resolve conflict between the desire to retain and reinforce the fruits from material wealth and the desire to comply with the requirements of sustainability. For a start we assume that 'well-being' (and its augmentation) is regarded as the objective to which transport purports to contribute. Well-being consists of two components 'human health' and 'material wealth'. To some extent both

[1] . The system is in all alternatives initially technically identical, although different regulation with different price impacts does lead to some technical differentiation due to differences in volume and type of investments.

components can reinforce each other, i.e. good health improves the chances to obtain material wealth, whereas material wealth enables to sustain good health levels. However, unsustainable processes to accumulate and maintain wealth, and spatially and socio-demographically inequitable distributions of wealth, have negative effects on human health, either directly via the production/consumption systems, or indirectly via natural systems (see figure 1).

The benefits of transport appear mainly on the material wealth side, whereas most of its external effects (inside the transport system or beyond) sooner or later affect human health (see figure 1). The external effects of transport can be regarded as an example of unsustainable accumulation and maintenance processes, just as in a similar way, the role of infrastructure in accelerating core-periphery developments is an example of a contribution to inequitable distribution effects.

Since transport is so dependent on the availability of physical infrastructure, land use, and spatial claims of infrastructure, play a crucial role. Land use functions more or less like a switchboard for many external and induced effects of transport, although the feedbacks and non-linearities are more complex than displayed here.

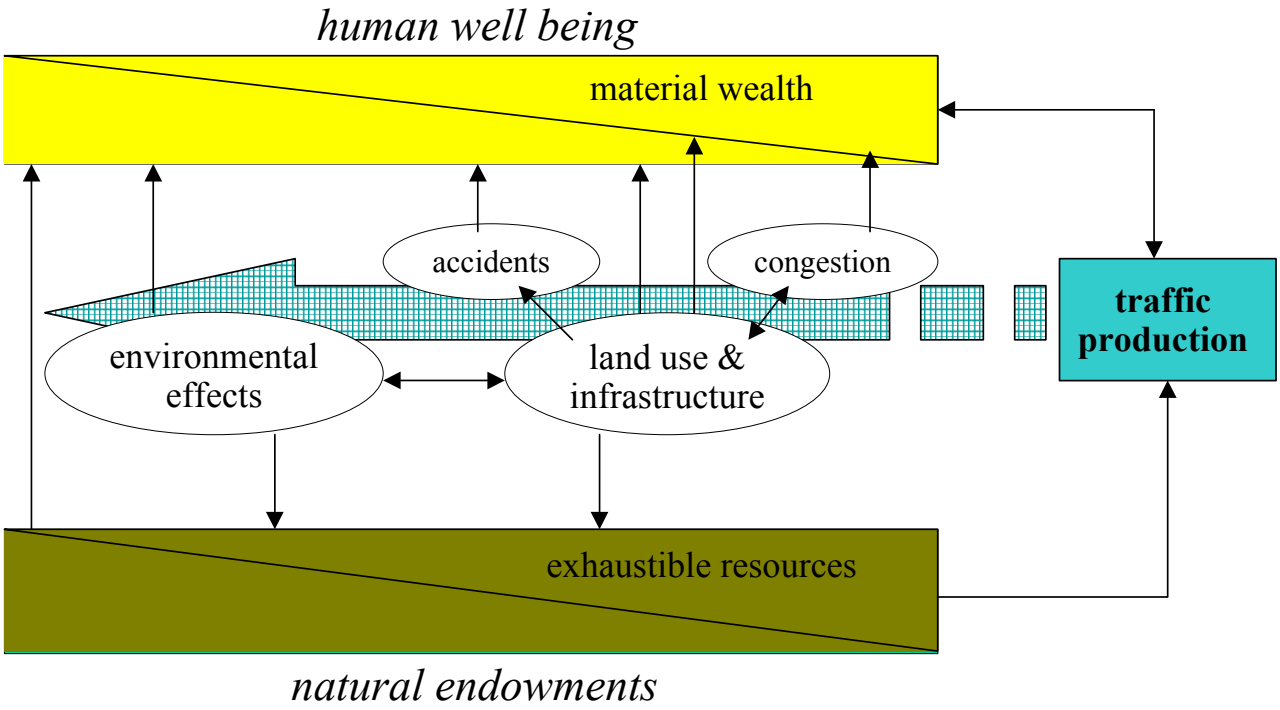

Figure 1. Inter-relationships between natural endowments, traffic production and well being

Also the temporal perspective is important for perceiving the possible interactions between the issues. The production (and consumption) of transport in the short run works directly on each of the phenomena (environment, safety, congestion, land use) separately, since the amount, shape and management approach of the infrastructure is largely given. In the medium term the issues of congestion, safety and environment may already feed back directly into land use and infrastructure management. In the longer run the impacts on health and material wealth will affect the volume, composition and spatial pattern of transport directly as well as via planned and market-guided reassessments of land use practices.

Highlights from the contributions

The conflict between maintaining material wealth and pursuing sustainability actually forms the central challenge of transport policy - not yet solved. The first two papers by David Banister and Dominic Stead, and William R. Black address this issue. Bannister and Stead give an overview of how transport systems have been performing in the recent past with respect to sustainability. They conclude that the available measurement concepts are inadequate and that, on the basis of the currently available material, the performance regarding so-called decoupling (low or even negative elasticities of transport production with respect to GDP growth) is rather mixed. Black discusses the introduction of a compound indicator of sustainable transport and potential mobility, which takes account both of the environmental impact and of the socio-economic need for mobility.

With the aging of the population, the mobility needs of the elderly increasingly raise the issue of the equity of access. Sandra Rosenbloom and Agneta Ståhl show how the growing automobility of an aging population poses environmental, safety, mobility, and community design challenges to developed societies. There exists a need for appropriate and cost-effective options to allow older people to reduce and eventually cease driving without seriously reducing their independence and sense of self-worth. Solutions to the problems created by automobility among the elderly have various impacts in transport policy when several key areas are included: vehicle design, transport alternatives, service delivery models, and community support and infrastructure.

As can be seen already from the discussion above, transport policies are in many ways interlinked with policies and actions from other sectors. Harry Geerlings and Dominic Stead review recent studies of various aspects of policy integration, especially with respect to the integration of transport, land use planning and environment policies. Most of the research is technical and mainly focuses on policy options, instruments or assessment methods, rather than on decision-making processes and/or implementation issues. Little attention has been given to organisational and/or institutional aspects of policy integration and how this relates to theories from organisational, policy or political sciences. The authors present a history of the changes in policy approach at member state and European Community level. Policy integration as a concept is widely accepted and also widely used at the strategic level. However as soon as implementation aspects come more to the forefront, rhetoric seems to displace performance. Understanding of the effectiveness of various instruments in particular contexts, and hence their transferability, is identified as an issue that merits more attention. Similarly, analyses that better map out interest and power structures will be helpful, since the mere active involvement of stakeholders does not guarantee progress in genuine policy integration.

A planning and appraisal phase -- discussed in the next three papers – usually precedes the implementation phase of transport policies. The two contributions on the assessment of impacts of land use and transport strategies concern recently developed models. The contribution of Douglas Hunt concerns a very large integrated agent based micro-simulation system encompassing spatial, economic, and behavioural components over very long time periods. The size of the model and its detailed features also require proper consideration of how these models should be used in a policy planning context, and of the prerequisites they impose on policy planning practices. The second contribution by Paul Pfaffenbichler and Simon Shepherd concerns a more compact model meant for the earlier investigative steps in

planning. The model is included in an appraisal framework together with objective functions and optimisation routines. It is important to also appreciate the fundamental differences in modelling assumptions between the two models. Hunt raises the question first in relation to calibration, but the significance goes beyond this. Indeed, the point is to what extent the concept of land use – economy interaction can be meaningfully represented by simulating processes tending towards an equilibrium. The third paper in this section by Yoram Shiftan et al. focuses on methods of assessing different transport externalities and their costs and on a methodology to better include externalities in the evaluation of transport projects.

Even though complicated models are used in the planning phase, it can happen that the impacts of implemented transport strategies are not predicted in a correct way. Two last papers in the issue take up possible reasons for this discrepancy. Bert van Wee et al. show that preferences for modes do exist and have an impact on people's residential choices. In particular, people with a preference for public transport include public transport accessibility in their residential choice. Preferences for modes have a significant impact on the number of trips, as well as on the distance travelled by mode. This conclusion holds for car use, the use of public transport and cycling. The omission of preferences for modes may result in an overestimation of the impact of land use on travel behaviour. This issue merits more research, whereas it also connects to the importance of lifestyles as a driving factor for volume and patterns of mobility. Lifestyles were identified as an important area for future research, which is also underscored by the abovementioned contribution of Rosenbloom and Ståhl on ageing. Furthermore, lifestyles are also connected to time use patterns, and henceforth important for transport policy, inter alia with respect to congestion. Darren M. Scott addresses in his paper the issue why congestion persists. His answer has three main points: actual travel behaviour do not coincide with the expectations on which the strategies are based, capacity increases usually induce more travel, and motor vehicle use is probably under priced.

Conclusions

Of the three pillars of sustainability, economy and ecology (and the stress between the two) receive plenty of attention. The third pillar, the social equity dimension, comes less often to the forefront, and if it does so, it is predominantly in connection to distribution of wealth across nations or generations. This would easily lead to the deceptive conclusion that the social pillar is a minor issue in transition towards sustainability. Several contributions (Black, Rosenbloom and Ståhl) exemplify that equitable accessibility will weigh heavy in the policy equation. Other presentations and discussions highlighted additional equity aspects such as an inequitable distribution of the (ancillary) cost and benefits of transport infrastructure. The seminar started out from the notion that sustainability would be elusive unless it becomes the point of departure for evidence-based policy formation. It ended on the conclusion that the social equity dimension of sustainability, which is frequently seen in terms of obstacles and limitations, would need to become a steering force on an equal footing with the economic and ecological dimensions, and that research priorities should recognise the opportunities and risks that all three contain. It seems that this is an area in which comparative research between North-America and Europe could be very fruitful.

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