SUSTAINABLE URBAN TRANSPORT POLICIES: FACILITATING EFFECTIVE DECISION MAKING

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ABSTRACT:
While there is a growing understanding of what might constitute a more sustainable urban transport policy, there are serious barriers to implementing such policies. The paper summarises a study of the barriers found in cities in developed countries, and discusses their relevance in the developing world. While some barriers, such as those of institutional structure and legislation, require intervention at a national level, others can be tackled by individual cities. In particular, much can be done to improve the process of policy formulation, the involvement of stakeholders, the effective use of information and skills, and the appropriate application of finance. The paper outlines European research which has developed new decision-support tools and guidance, and discusses their applicability to the developing world. Such tools are, however, only of benefit if cities are encouraged and assisted to apply them. The paper concludes by discussing how this might be achieved.

[French version to come]

Introduction

Many governments are now advocating the development of sustainable urban transport systems. The European Commission has recently issued a Green Paper on the pursuit of such a policy for all European cities (EC 2007). But the concept of sustainability is still being interpreted in widely differing ways, leading to different policy recommendations. Moreover, while there is agreement on what constitutes a potentially sustainable transport strategy, as in recent work by the then European Conference of Ministers of Transport (ECMT 2006), there are significant barriers to implementing such strategies. In this paper we consider how best to interpret the concept of sustainability, review the barriers to achieving more sustainable strategies, and outline recent research into reducing the barriers to implementing such strategies. At each stage we consider the relevance of such research for the cities of the developing world.

The meaning of sustainability

The concept of sustainability was introduced by the Brundtland Commission in 1987 as an approach which meets the needs of the current generation without reducing the ability of future generations to meet their needs (Brundtland 1987). This concept of inter-generational equity remains an important force in current thinking, given concerns that global warming and fossil fuel depletion will severely limit our grandchildren's ability to enjoy the opportunities which we do.

However, the concept of sustainability has since broadened to one which encompasses environmental sustainability, social sustainability and economic sustainability (Lautso et al. 2004). The environmental aspects include the concerns for the global environment as well as the more immediate local environmental impacts of transport. The social aspects involve inequities today between rich and poor, within cities and between countries, but also address the original Brundtland concern for future generations. Both of these are areas in which it is accepted that enhancements are needed. But those enhancements will only be affordable if the economy itself is sustained so that we can afford such enhancements.

Unfortunately, this broadening of the concept has resulted in the term being used to justify a wide range of differing policies and aspirations. The lack of a common understanding of the term has also contributed to a lack of coherent action. It is therefore necessary to define these terms more specifically. An ECMT report on Sustainable Transport Policy (ECMT 2000) identified nine objectives. These are shown in Table 1 with a suggested allocation to the three "legs" of sustainability.

Table 1 Transport objectives and their contributions to sustainability

ECMT Transport Objectives (2000)	Sustainability "leg"		
	economic	social	environmental
improving transport safety	✓	✓	
creating wealth	✓		
improving access		✓	
reducing congestion	✓		✓
reducing severance, fear, intimidation		✓	
protecting landscapes and biodiversity		✓	✓
reducing noise			✓
reducing greenhouse gas emissions			✓
improving air quality			✓

Cities' abilities to develop sustainable transport strategies
An earlier study by the European Conference of Ministers of Transport (ECMT 1995) had already focused attention on the importance of improvements in public transport, better management of road space and controls on the demand for car use as the key elements in a sustainable urban transport strategy.

Two research programmes have also independently identified these as the key elements of a sustainable urban transport strategy for European cities. The EC PROPOLIS project

(Lautso et al. 2004) concluded that the key contributors were improvements to public transport services and fares, pricing of urban car use, and more concentrated land use development. A separate UK project (May et al. 2005b) identified bus frequency increases, fares reductions and charging for car use, together with low cost improvements in road capacity as the most effective combinations.

Subsequent reviews (ECMT 2002, 2006), however, concluded that the implementation of such sustainable transport strategies was "more easily said than done". The reviews highlighted as the principal barriers poor policy integration and coordination, counterproductive institutional roles, weaknesses in the process of policy formulation, unsupportive regulatory frameworks, weaknesses in pricing, poor data quality and quantity, limited public support and lack of political resolve. A subsequent review of four ECMT projects, on accessibility enhancements, carbon reduction, safety and urban transport, identified similar barriers in all four areas of policy. It made a series of recommendations for ways in which governments might address them (May and Crass 2007).

Work for the Asian Development Bank has highlighted similar issues in developing cities. Case study cities have typically lacked effective governance, and have relied too much on experts and their "black box" transport models, rather than involving stakeholders and developing strategies which will be affordable and acceptable. As a result transport plans are often ambitious wish-lists which have little chance of being implemented. Partly as a result there is a lack of empirical evidence on the performance of alternative solutions, which in turn reinforces the reliance on infrastructure projects (Allport, 2008).

Developing decision-support tools for cities
The EC City of Tomorrow research programme, conducted between 2000 and 2005, included a number of projects on land use and transport research (www.lutr.net) which between them provided valuable advice on the process of policy formulation. Much of the guidance was encapsulated into a Decision-Makers' Guidebook (May et al. 2005a) which was designed to introduce policy makers, senior professionals and interest groups to the key stages in policy making, and to provide advice. The Guidebook is available on the website www.konsult.leeds.ac.uk.

Its developers acknowledged the rich diversity of contexts and cultures in European cities and accepted that no one approach would be relevant for all cities. Reflecting this, the document provides guidance rather than being prescriptive. However, the guidance adopts a logical structure for transport policy formulation, which readers are encouraged to follow. This logical structure, shown in Figure 1, starts with a clear statement of the city's objectives and an identification of the problems to be tackled. It uses these to stimulate the identification of possible solutions and overall strategies, which are developed taking into account the barriers to be overcome in implementing them. The likely impacts of these strategies are then predicted and appraised, prior to selecting a preferred approach for implementation.

Figure 1 The logical structure for decision making
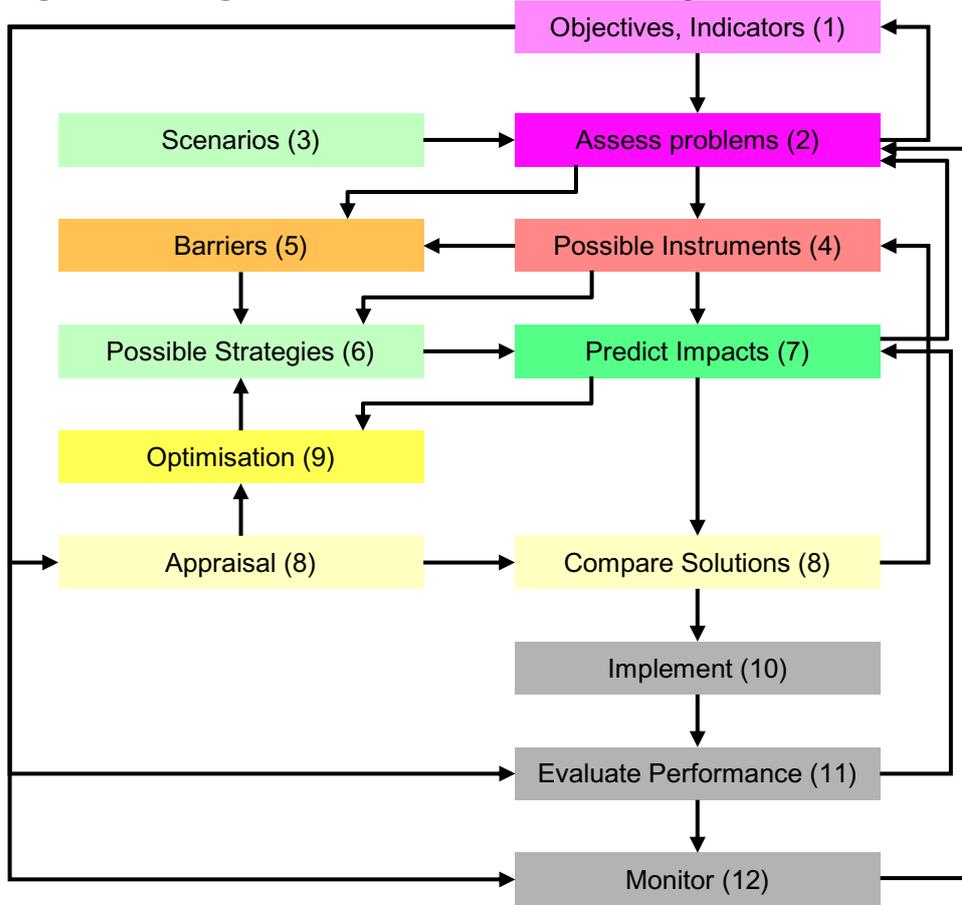
(Source: May et al, 2005a).

The challenges which cities face in decision making have formed the focus of a four year research programme, funded under the UK Engineering and Physical Sciences Research Council's Sustainable Urban Environment initiative. The programme, DISTILLATE (Design and Implementation Support Tools for Integrated Local Land use, Transport and the Environment) was designed to help overcome those barriers to decision making which were amenable to research-led solutions. It concentrated in particular on the specification of objectives and indicators, the development of strategic policy options, the effective use of sources of finance, and the prediction and appraisal of alternative options. It set itself a vision of helping, though developments in each of these fields, to achieve a step change in the way that sustainable urban transport and land use strategies are developed and delivered (May et al, 2009).

The relevance to cities in the developing world
There is always a danger that policy recommendations and decision-support tools developed for one environment are transferred to another context without considering their appropriateness in differing circumstances. While the Decision-Makers' Guidebook and subsequent decision-support tools were designed to reflect the diversity of cultures and contexts in Europe, there was thus no guarantee that would be relevant to the needs of cities in developing countries. A related EU-funded project, SPARKLE

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(Sustainability Planning for Asian Cities making use of Research, Know-how and Lessons from Europe) was developed to assess the transferability of such methods to four countries in South East Asia: Cambodia, Laos, Thailand and Vietnam (SPARKLE, 2004). The researchers noted the major differences between South East Asia and Europe in rates of population growth, motorisation and the mix of transport modes and, fundamentally, in the approaches to decision-making (Emberger et al, 2009).

Given these differences they concluded that it would be valuable, in particular, to consider the different emphasis which might be placed on policy objectives and barriers, and on solutions, in the two contexts. They did so by introducing the concepts in the Decision-Makers' Guidebook to two seminars and eight workshops in the four countries, discussing their relevance with participants and seeking suggestions for additional concepts and attributes. Their findings are reported as appropriate below. In passing, it should be noted that their findings cannot be taken as necessarily appropriate to developing cities elsewhere. However, their approach to questioning, based on the logical structure of Figure 1, should be transferable.

Policy objectives and performance indicators

The Decision-Makers' Guidebook stresses the need for cities to determine their own policy objectives, and hence their own interpretations of the concept of sustainability. However, it used a series of surveys of European cities to suggest those which were most likely to be considered. Table 2 lists the seven objectives from the initial version of the Guidebook (an eighth, enhancement of health, was added to the 2005 version). It can be seen that these relate closely to the list from ECMT in Table 1. It also shows the results of two parallel surveys, one of 60 representative European cities (Matthews and May, 2001) and the other from the cities represented in SPARKLE. In each case cities were asked to identify which of these objectives were of high, medium and low priority to them. There are a number of clear parallels, in that European and South East Asian cities both give high priority to efficiency (and particularly the relief of congestion) and economic growth, and both give low priority to intra- and inter-generational equity. However, there are also important differences, with South East Asian cities giving less emphasis to environment and safety. South East Asian cities also added a further objective, of protecting local culture, which was perhaps implicit in the European concepts of environment and liveability, but had not been identified as a separate issue.

Table 2: Current priority of objectives in South East Asian cities in comparison with Europe (Emberger et al, 2009)

Objectives	Priority		
	High	Medium	Low
Economic efficiency	√ x		
Protection of the environment		x	√
Liveable streets and neighbourhoods		√ x	
Safety	x	√	
Equity and social inclusion			√ x
Contribution to economic growth	√ x		
Intergenerational equity			√ x

Legend:
√ South East Asian cities (results of SPARKLE seminars and workshops)
x. European cities from the PROSPECTS survey (Matthews and May 2001)

In practice, these objectives are usually represented, at least in European practice, by a series of performance indicators. Research in DISTILLATE showed that monitoring against performance indicators can all too easily become a task carried out to satisfy others rather than, as suggested in Figure 1, a key input to the policy formulation process. Moreover, many of the indicators used simply measure outputs in terms of actions taken (such as length of cycle lane) rather than intermediate outcomes (such as growth in cycling) or final outcomes (such as reductions in congestion or pollution).

In response, the DISTILLATE team has produced three guidebooks (Marsden and Snell, 2009). The first advises readers on how to design a monitoring strategy to support sustainable transport goals, such as those listed in Table 1. It demonstrates the use of a causal flow diagram between interventions (such as cycle lanes) and objectives (such as environmental improvement) to identify the information needed to understand what is happening. It advocates the use of a combination of intermediate outcome and final outcome indicators to better understand the impacts of a given strategy. The second guidebook provides more detailed advice on how to select indicators suitable for a particular objective, and offers an audit process. The final guidebook broadens the scope to consider how such monitoring strategies can be extended to other policy sectors and to regional strategy. These guidebooks should be of wider applicability, since they can be used to interpret any set of objectives. In developing cities they should also help to make the most effective use of the scarce resources available to collect data.

Barriers to the achievement of objectives

The Decision-Makers' Guidebook had identified four principal barriers to strategy formulation (May et al, 2005a):

- *Legislation and institutional barriers.* These include lack of legal powers to implement a particular instrument, and legal responsibilities which are split between agencies, limiting the ability of the city authority to implement the affected instrument.
- *Financial barriers.* These include budget restrictions limiting the overall expenditure on the strategy, financial restrictions on specific instruments, and limitations on the flexibility with which revenues can be used to finance the full range of instruments.
- *Political and cultural barriers.* These include lack of political or public acceptance of an instrument, restrictions imposed by pressure groups, and cultural attributes, such as attitudes to enforcement, which influence the effectiveness of instruments.
- *Practical and technological barriers.* For land use and infrastructure these may well include land acquisition. For management and pricing, enforcement and administration are key issues. For infrastructure, management and information systems, engineering design and availability of technology may

limit progress. Generally, lack of key skills and expertise can be a significant barrier to progress.

The work in SPARKLE confirmed that these were all relevant in South East Asia, and that some, such as institutional structures, finance and skills were significantly more serious than in Europe. However, it also suggested that, while most of these barriers were flexible, and could be overcome through appropriate political action, the cities of South East Asia were facing three more rigid barriers: the political system and the role of decision-makers, the increasingly private-vehicle oriented design of many cities, and the irreversibility of car using behaviours and habits (Emberger et al, 2009). This, and the work by Allport (2008), suggests that the political and cultural barriers identified in the Guidebook may be much more serious, and more difficult to overcome, in developing cities which begin to espouse car-based travel and development.

Appropriate policy options

The Decision-Makers' Guidebook identifies six broad categories of policy instrument, as listed in Table 3; for infrastructure, management and pricing it sub-divides these into policies related to the car, public transport, walking and cycling, and freight. This categorisation is also used in the related knowledgebase on urban transport policy, KonSULT (www.konsult.leeds.ac.uk). Table 3 indicates which of these are seen as of high, medium and low importance in European and South East Asian cities. Here there is much less consistency than in Table 2. South East Asian cities give much more emphasis to infrastructure provision, particularly in the form of new roads, and place less emphasis on land use planning, information provision and pricing, than European cities. Only in the areas of management and awareness are the emphases similar, but even so these policy instruments are likely to be used more specifically for car users in South East Asian cities than in Europe. Once again these findings parallel those of the Asian Development Bank (Allport, 2008).

Table 3: Policy instruments currently used in South East Asian cities in comparison with Europe (after Emberger et al, 2009)

Policy	Level of use		
	High	Medium	Low
Land use measures	x	√	
Infrastructure provision	√		x
Management of the infrastructure	√ x		
Information provision		x	√
Attitudinal and behavioural measures		√ x	
Pricing		x	√

Legend:
√ .... South East Asian cities (results of SPARKLE seminars and workshops)
x .... European cities from the PROSPECTS survey (Matthews and May 2001)

Even in Europe, research has suggested that cities are typically not very innovative, place too much emphasis on supply-side solutions, and are reluctant to use demand

management measures (EC, 2007). In part this is because they lack information on the performance of different solutions (Atkins 2007). There is thus a need for tools which prompt cities, in Europe and to an even greater extent in the developing world, to generate solutions appropriate to their objectives and to the problems which they face.

As a contribution, the DISTILLATE team has developed a strategic option generation tool that uses the KonSULT library of some 42 transport and land use policy instruments (www.konsult.leeds.ac.uk). The option generator enables users to interrogate KonSULT to identify those instruments which are likely to be most useful in a specified context. The aim is to broaden the range of policy instruments which are considered, rather than to dictate a particular solution. Users can focus on their objectives, problems or performance indicators, specify their relative importance, indicate the overall strategy which they wish to pursue and identify the context in which they are working. The option generator then uses the assessment scores for each instrument in KonSULT to identify those instruments which are likely to contribute most effectively (Kelly et al, 2009). This tool is still being tested in applications in Europe and would not necessarily be appropriate to developing cities, since the KonSULT assessment scores are based on European experience, and relate to policy instruments in use there. However, the principles on which it is based, which combine user-specified objectives, problems and strategies with empirical evidence of performance, should be transferable.

Predicting the impacts of alternative solutions
The impacts of many of the policy options considered in KonSULT are difficult to predict without access to a model which reflects the complex interactions between demand and supply. However, even in Europe many local authorities make only limited use of models, particularly as a result of the complexity of existing models, their lack of skills in using them, and their failure to understand and hence to trust their outputs. The DISTILLATE programme has helped to overcome these barriers by enhancing a simpler strategic land use - transport model, MARS, for use in strategy development. MARS is capable of analysing policy combinations at the metropolitan level and assessing their impacts over a 30 year planning period in less than one minute (Pfaffenbichler et al. 2008). It has already been tested in cities in Thailand and Vietnam, reflecting local trends in demand and user choice, such as the heavy reliance on motorised two wheelers in Vietnamese cites.

In DISTILLATE, a "flight simulator" approach has been adopted which allows users to change policies in a simulation environment with easy to use "slider bars". Outputs, based on intermediate and final outcome indicators, can be presented in graphical, tabular and map-based formats. In addition an optimisation facility can be used to optimise a package of policy instruments against a given set of objectives or targets. Potentially a policy maker or stakeholder group can take a package of suggested policy instruments from KonSULT and decide how best to combine them in a given context. This facility also enables the planner to look at the impacts of target setting and to identify potential trajectories for key indicators (Shepherd et al. 2009).

The way forward for developing cities?

In his study for the Asian Development Bank, Allport (2008) argues for a new paradigm in which policy is defined by "what works", land use planning is part of the solution, demand is managed to match supply, overall plans and specific projects are shown to be relevant, affordable and adaptable, and implementation is fostered by convincing a sceptical stakeholder community of the plan's merits. These principles are in many ways similar to those emerging from European policy advice (May et al, 2005a; ECMT, 2006; EC, 2007). In both contexts they offer an approach which addresses the wider range of policy objectives and user needs, considers the full range of policy options, and adopts those which best overcome the barriers of stakeholder acceptance and affordability. However, they require a step change away from the paradigm in which infrastructure projects designed to meet the needs of car users dominate policy making. As Emberger et al (2009) note, this may already be more difficult to achieve in developing cities than in the developed world.

It will be for individual cities to decide whether to adopt this new paradigm, though they are likely to be influenced by the policies of their national governments, and the expectations of their funding agencies. The European Commission's focus on (inter-) national guidance and the Asian Development Bank's willingness to consider making funding conditional on the new paradigm's principles are both good examples of the support and encouragement which cities need.

Cities which adopt this new paradigm will also need support in the process of decision-making. Tools such as the Decision-Makers' Guidebook, the KonSULT option generator and the MARS sketch planning model are all potentially of value, but need to be adapted to local conditions and local needs. Evidence from SPARKLE suggests that this is possible, but the process of adaptation, testing and dissemination needs continuing support. This, too, may be a valuable role for the funding agencies.

But cities are likely to learn more from the good practice of their peers than from the advice of external experts, and decision-support tools must be seen as an aid to this process rather than a replacement for it. The European CIVITAS programme already demonstrates the benefits to be gained from supporting cities in learning from one another (EC, 2007). An approach in which the funding agencies support such learning, and the decision-support tools to underpin it, may in the end prove more effective than financial support for the strategies themselves.

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