The EVIDENCE Project: Origins, Review Findings and Prospects for Enhanced Urban Transport Appraisal and Evaluation in the Future

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The project:

The EVIDENCE project[1] sets out to provide objective, robust information to support local and European policy initiatives seeking a substantial change in the flow of funding towards sustainable urban transport investments. In particular it has focussed on EU funding for transport in cities delivered through the Sustainable Urban Mobility Plan (SUMP) process – a European program crucial to helping newer member states deliver sustainable mobility in their cities. Whilst delivering more sustainable urban mobility is a policy objective of the EU, many of those involved in such endeavours report that they are in need of more information about the range of interventions and packages of interventions available to them. In particular they need to know more about the economic benefits of sustainable urban mobility choices, as local politicians and other stakeholders see an important role for mobility in supporting their local economies, and hitherto the 'received wisdom' has often asserted that it is primarily car and lorry-oriented transport investment that delivers the prosperity they seek.

In response to the need to address such perceptions, EVIDENCE has looked for and assessed existing evidence for economic benefits arising from sustainable mobility implementations arising from twenty-two different categories of measures typically found in SUMPs (see Table 1 below). Most of the twenty-two include multiple, related interventions and reflect the types of demonstration initiative delivered through Europe urban mobility programmes, such as CIVITAS. However, the sources drawn upon in collating the evidence are much wider than those arising from European projects. Literature searching by the research team drew upon academic journals and books, and reports from government and other agencies across the globe. For this reason, the potentially-relevant body of evidence would cover thousands of documents. Clearly, a single, small research team working for a year could not review every item in detail. However, a selection process (see Shergold & Parkhurst, 2016) sought to ensure that the sources which were both important in terms of their evidence and complied with internationally-accepted standards of robust evaluation methodology were included. In practice, this process resulted in a larger body of core sources in respect of some measures than others. Indeed, a sufficient quantity of relevant, high quality evidence was not found in every case.

As part of the review process, considerable effort was made to try to uncover evidence sources from practitioners and policy agencies, but unfortunately few responses were received and those that were received were often constrained by lack of clarity over data confidentiality. The team did successfully review source documents in a range of European languages, but for some countries where material might expect to be seen (for example France), the results were limited and in general there were issues with sourcing much material in languages other than English.

In all, three-hundred-and-fifty-one documents were reviewed in depth for the analysis across the measures. Extensive economic evidence was found for around a third of them, although at least some evidence was found for all of the measures. In around half of cases the economic benefits focussed around reduced use of private cars, and the indirect benefits this reduction created in terms of reduced road congestion for other travellers, notably those continuing to use a car. Broader social and environmental benefits were in some instances also included in the economic evaluations reviewed, these were not the primary focus of the EVIDENCE Project (and their detailed consideration is left to other studies and publications). However, important additional benefits with longer-run economic consequences were also identified in respect of many measures, particularly where they were linked to reduced air pollution and higher physical activity.

[1] Description of Evidence from Project documents

Theme	No	Measures	Example interventions
Clean vehicles and fuels	1	Electric battery and Fuel Cell vehicles	E-vehicles and H_2 vehicles (except ICE) and infrastructure e.g. charging point provision. Includes e-bikes, cars & buses
	2	Cleaner vehicles	Alternative fuels for ICEs and associated infrastructure e.g. retrofitting buses; hybrid vehicles which are not plug-in.
Urban freight	3	Urban freight	Freight consolidation; cycle logistics; HGV route/weight restriction enforcement.
Demand management strategies	4	Access restrictions	Pedestrianisation; limited traffic zones; restrictions on through traffic e.g. zonal access schemes; bus gates.
	5	Roadspace reallocation	Public transport lanes, HOV/HOT lanes, cycle lanes, carriageway narrowing (including reallocation to walking and cycling)
	6	Environmental zones	Zones which control driver behaviour or limit access to vehicles achieving emissions limits e.g. Low emissions zones
	7	Congestion charges	Urban road pricing including HOT lanes.
	8	Parking	Time-based and permit-based restrictions; fee-based management; parking enforcement
Mobility management	9	Site-based travel plans	Corporate, school, university, public buildings, major traffic generators (hospitals, stadia).
	10	Personalised travel planning	Individually focussed travel planning, such as that seen in new housing developments.
	11	Marketing and rewarding	Marketing / social marketing which is brand / image / lifestyle focussed. Rewards-based schemes, e.g. Ecodriving.
Collective passenger transport	12	Public transport enhancements	Enhancements other than fuel/power systems. Includes accessibility, subsidies, fare incentives, integrated ticketing
	13	New public transport systems	New forms of public transport services BRT, LRT, guided bus, DRT/collective taxis, transit-oriented development
	14	Integration of modes	P&R, bike-rail integration, cross-modal ticketing, cross-modal interchanges
Transport telematics	15	e-ticketing	'Smart ticketing' on mobile, smartcard, payment card, contactless cards
	16	Traffic management	Urban traffic optimisation systems; selective bus priority
	17	Travel information	Includes traditional information provision and single and multi-modal journal planners
Less car dependent mobility options	18	New models of car use	Car share (free floating and fixed) and carpool (incl vanpool)
	19	Walking	Organised collective walking; walking buses; promotion; infrastructure etc.
	20	Cycling	New carriageway lanes, new off-road paths, bike loan schemes, bikeability training.
	21	Bike sharing	Provision of collectively owned bikes/e-bikes via on-street automatic hire arrangements for time-limited periods.
	22	Inclusive urban design	Schemes in which motor traffic is not eliminated but managed through design e.g. homezones, shared space

Table 1: Themes and measures explored by EVIDENCE

[2] Initially it had been intended to consider car-sharing and car-pooling as separate measures, but in practice there was insufficient potentially-

The resulting outputs from the study (including the twenty-two individual measure reviews) are targeted at professionals, such as local authority officers, who are directly involved in implementation, although they will also be of relevance to other stakeholders, notably volunteer and professional experts working for Non-Governmental Organisations which promote sustainable mobility.

Results

Seven of the twenty-two measures reviewed were associated with strong evidence of economic benefits (in respect of both quality and quantity of material). These measures were:

- cycling (infrastructure);
- new public transport systems;
- enhancements to public transport systems;
- parking management;
- cleaner vehicles;
- site-based travel plans and;
- personalised travel planning.

In addition, the evidence on environmental zones was strong, but sources were limited. For the remaining measures, the evidence was methodologically weaker and in some cases also scarce. In all but one area (enhanced traveller information), the economic benefits of a specific measure were found to be enhanced by introducing it as part of a carefully integrated package. In general terms, effective packages needed to contain both new supply features for modes and behaviours encouraged by policy alongside demand restraint measures associated with modes and behaviours discouraged by policy.

What became clear from the study outputs was that, due to the diverse nature of the economic benefits for the different measures, and the contingencies between them, it was not realistic to simply compare them in terms of relative net economic value. Instead, cities are advised to select measures by carefully considering the policy objectives and the evidence about the known effects of a measure. This selection process should then be combined with a holistic appraisal process related to wider policy objectives, and careful design of an evaluation strategy to enable reflective analysis as to whether the measure has delivered against the policy objectives in the long-run. Such an approach will provide for an effective, objective, and evidence-based 'implementation culture' which will aid local policy delivery as well as adding to the international evidence on SUMP measure effectiveness.

Appraisal

The undertaking of this review has also provided an opportunity to reflect on how choices and decisions about mobility-related schemes are currently made. The analysis described above confirms that sustainable transport choices have the potential to reduce congestion and pollution and create highly attractive living environments. It also offers support to the assertion that cities which reduce the number of motorised vehicles and provide high-quality walking and cycling facilities set in an attractive public realm will be more successful than those characterised by high levels of vehicle traffic, congested roads and air pollution. However, whilst the study findings will help cities to take a more sustainable approach to delivering the mobility that both their residents and commerce require, it is not enough on its own to make a sufficient change. Establishing the changes necessary will also require a new attitude and approach to valuing the benefits that interventions might bring, and to the way that funding for mobility solutions is apportioned and delivered.

The first crucial step in this reorientation is to re-evaluate the current approach to enabling and delivering mobility for people and organisations in a city. Project appraisal is widely used to justify infrastructure interventions, including for mobility, but current practice in this area is seen to be problematic for those looking to deploy more-sustainable interventions.

The ex-ante appraisal techniques used to assess traditional transport infrastructure schemes are generally considered to be the 'gold standard', and have become highly developed in some European countries. They are commonly presented by

relevant material available on the separate elements to create two reviews, as well as there being some overlaps in content, so they were merged.

politicians as scientifically validated fact; whereas there is perception that appraisal for sustainable transport measures are somehow inferior and informed by 'pseudo-science'. As such they are accepted and endorsed by many national governments as the most appropriate methodological approach, meaning that sustainable transport initiatives are also typically required to be evaluated this way at present. Yet these appraisal methods may have been developed, designed and fine-tuned specifically to assess projects such as road and rail schemes. An example of this is the use of the 'value of time', seen as a key input for appraisal, even though it is a concept seen as highly contentious (Whitelegg, 1993; Metz, 2008). This particular metric has been identified as the main reason why appraisal techniques tend to favour major infrastructure projects, and, without it, most would struggle to demonstrate high value. In contrast, many sustainable transport initiatives are implemented to address other criteria, not to shave small amounts of time of a journey. Cycling projects for example improve health, but are often assessed in relation to their ability to encourage mode-shift, reduce traffic congestion and improve journey times for motorists. Public realm schemes improve the liveability of urban places, increasing walking and cycling but are often considered to offer a negative benefit because of the potential to increase journey times.

Given the considerable effort and expense invested in ex ante appraisal, it is striking how little attention has been paid to ex post evaluation: the outcomes. For example, when 'traditional' transport infrastructure projects such as road schemes are developed there is apparently an implicit 'belief' that the benefits identified in advance will definitely be delivered in full, albeit that it is increasingly evident that substantial optimism bias often occurs in the pre-delivery project appraisal. The benefits are typically quantified through some form of Cost Benefit Analysis (CBA), yet the extent to which the forecast benefits are actually delivered is rarely tested after implementation, with post-completion evaluation often perceived as an unnecessary luxury for schemes that are considered to have already 'proven' their value. Many schemes will have low Benefit-Cost Ratios (BCR) that are difficult to verify after implementation, and when studies do seek to validate the resulting local and regional economic development benefits, the findings are often at best inconclusive; for example relying on anecdotal evidence (Highways England, 2013).

Current appraisal practice is also undermined by the fact that frequently the political decisions to improve infrastructure are taken prior to any work to quantify the potential costs and benefits, placing the onus on an appraiser to achieve the best possible BCR. In many ways this pressure to validate the political decision transforms the 'science' of appraisal into an 'art'. It is a grey-area, neither right nor strictly wrong, although an increasing number of practitioners question the integrity and indeed the ethics of doing this (Hollander, 2015).

In contrast, appraisal for sustainable transport initiatives mostly happens after delivery, with evaluation requirements that may be more expensive and onerous than the actual intervention. However, as noted in the previous section, this ongoing intense scrutinising and evaluative activity has already, over the last two decades, provided firm evidence for a number of the sustainable transport initiatives that could be deployed in a SUMP, making the benefits demonstrable. This is in considerable contrast to the generally hypothetical appraisals (i.e. not validated ex post) that are undertaken for traditional infrastructure projects.

These problems highlight the fact that more appropriate approaches, such as Multi-Criteria Analysis (MCA), should be embraced to support realistic assessment of sustainable transport initiatives. Not because such interventions "cannot compete" with traditional infrastructure investment, but because the rules of the game are heavily in favour of traditional transport measures when a direct comparison is made. The reality is that if all appraisal appeals to the 'best case' then investment in sustainable transport measures will regularly outperform traditional infrastructure measures.

Changing the way that appraisal is carried out is however only part of the challenge to realign funding into sustainable transport initiatives, it will also be important to address what is effectively a pre-determination of best solutions when allocating national and local budgets. Current appraisal techniques are mainly used to prioritise projects within pre-allocated funding streams, with politicians deciding how much money to allocate, and setting the rules about what that money can be used for. This means, for example, that highway projects are appraised against other highway projects, while other, more sustainable alternatives to address the same mobility problem are not considered because the funding rules do not allow them to be appraised as different options. If sustainable transport options were appraised as an alternative, for example using MCA, it would help illuminate the value in such interventions which otherwise might be lost in standard appraisal techniques.

Conclusions

As the twenty-two evidence reviews published in this volume demonstrate, the EVIDENCE Project has identified a number of SUMP measures where local administrations and other stakeholders within the urban transport planning process can be confident that the allocation of enhanced resources will be beneficial from an economic perspective alone. However, even where the evidence of economic benefits is currently not of good quantity or methodological quality, it is likely that all or nearly all of these measures have wider economic benefits. Very often those measures will also have strong benefits in the social or environmental domains, which might be sufficient to justify their application in the meantime, whilst the economic evidence-base is further developed.

Due to pressing environmental and social concerns, the transport sector is being pushed to consider a wide and growing range of policy objectives alongside economic ones. There is also growing concern that past interventions in the sector have not always been effective in delivering their intended policy objectives. This makes the choice of project appraisal methods a critical one, and important caveats and constraints must be applied when considering the use of traditional CBA to evaluate measures for a SUMP:

- CBA will be more relevant for some measure than others, and not at all for some;
- The nature of CBA means it tends to promote aspects of mobility least associated with holistic sustainability, namely faster travel times and greater capacity;
- CBA cannot capture all the economic benefits of measures, and attempts to reform CBA will not resolve this problem, due to its focus on direct, monetisable effects.
- In the EVIDENCE reviews, the absence of a CBA was not accepted as meaning that economic benefits were not generated by a measure, and where a CBA was present, it was not assumed to represent the actual net economic value. In other words, CBA evidence was just one form of economic information informing the reviews.

Fundamentally there is a need for greater transparency in why and how money is ring-fenced by politicians for certain types of scheme or initiative. We need in future the ability to compare all the different solutions, and to allocate funding according to the ability to deliver best economic return on investment. Formalised appraisal methodologies applied to traditional infrastructure projects are commonly presented by politicians as scientifically validated fact, whereas there is a perception that appraisals conducted for sustainable transport measures are somehow inferior and informed by 'pseudo-science'. Given the care and complexity with which packages of sustainable mobility measures can be targeted and designed, the likelihood is that, if all appraisal appeals to the 'best case' investment to achieve specific long-run objectives, then the sustainable transport measures will regularly outperform current traditional infrastructure measures.

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