

DEMONSTRATING THE REGENERATION IMPACTS OF TRANSPORT INVESTMENT

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1. INTRODUCTION

Historically it is clear that past transport changes have had enormous effects on urban form and function. For a number of reasons, this influence has not featured significantly in the formal evaluation of most recent transport schemes. The development of means of mass transport played a major role in the trend of urban concentration in the nineteenth century, and increasing dominance of car and lorry have played an equally large part in the dispersion of people and activity away from cities since 1945. The importance of transport has however tended to be taken as read, and transport proposals have been judged primarily by how efficiently they perform in transport terms - on measures such as time-savings to users, reductions in accidents and financial performance of operators.

Increasing concern about the wider effects of transport investment mean that this is no longer tenable. It is now recognised that, in congested conditions, road-building may generate additional traffic, making meeting demand ('predict and provide') a hopeless task, and that the balance of investment between public and private transport may critically affect the achievement of urban policy aims.

Policies on urban regeneration have evolved in important ways over the last few years, and may be expected to continue to do so. At all levels there has been increased recognition of the interdependency of the many different aspects of urban regeneration and the need therefore to pursue synergies in a purposeful manner. A wide range of economic and social processes are involved: good transport may be a necessary condition but is unlikely to be sufficient. Recognising this, collaboration is increasingly the norm, with action directed by (and often through) partnerships between public, private, voluntary and community agencies.

Three main tendencies are of particular relevance in the UK:

- a decline in 'protected' transport budgets;
- a move from needs-based to programme-based funding;
- a shift to focus multi-purpose spending programmes on small areas; and
- an increasing stress on partnership.

These developments create significant problems for the proper consideration of the transport contribution:

- an inherent characteristic of a transport improvement is that its benefits are not necessarily found in the same locality; better access from a neighbourhood to a distant source of employment may depend on a network improvement in between, which would be excluded from a small-area based bid;
- disbenefits from transport improvements (eg noise, severance, visual intrusion) may be disproportionately concentrated in the locality; and
- transport can be a double-edged weapon: better local access to distant jobs will usually also mean better access from a distance to local jobs.

In the light of these considerations, The MVA Consultancy has been commissioned to lead two related studies, in collaboration with Segal Quince Wicksteed and the David Simmonds Consultancy. The Merseytravel study¹ is concerned with all aspects of the relationship between public transport investment and the social and economic regeneration of Merseyside. The objectives of the study are:

- to examine the ways in which public transport provision can affect and contribute to the economic and social regeneration of Merseyside and, from this;
- to develop guidelines for assessing the regeneration effects of specific public transport proposals.

The second study, commissioned by a consortium of local authorities and the Government Office in the West Midlands², is both wider and narrower in its scope. It is concerned with evaluating the impact of all transport proposals (not just public transport) on the area, but focuses specifically on the objectives and requirements of the European Fund for Regional Development (ERDF). The main objective is to improve the justification, appraisal and monitoring of transport proposals seeking ERDF support, through a re-examination of the strategic role of transport in meeting the aims of ERDF.

Based upon an analysis of the ways in which transport activities lead to economic, social and environmental outputs, and hence to impacts upon ERDF objectives, our aim has been to consider how evaluation procedures might be extended so as to be able to take account of the very major economic, social and environmental effects that transport can have in the longer term.

2. TRANSPORT AND ACTIVITY

The relationship between transport and urban form is continuous, mutual and dynamic:

- the transport system shapes the city, but the previous growth of the city shapes and constrains the transport alternatives that are available;
- changes in the transport system often reinforce the development processes that led to the need for the transport change and this self-reinforcement (positive feedback) is destabilising, because the further such changes go, the faster they go.

The reasons why we expect transport changes to affect both the social and physical components of urban change can be summarised as follows:

- transport changes affect accessibility - how easily residents can reach different opportunities (work, shopping, health facilities, etc);

- accessibility is one of the influences on location choice - where people and business choose to locate, and whether they feel that they need to move;
- accessibility is also a more direct influence on the economic success of individuals - whether they can get jobs - and of businesses - how many customers they can attract;
- these influences on prosperity and location will, if significant, affect the demand to live in particular parts of the conurbation, and hence influence the prices of housing and of non-residential property;
- changes in demand and in price will affect other people, who were not directly affected by the original transport change;
- ultimately they will affect the physical fabric of different areas, as more or less money is spent on maintenance and improvement or on new development.

The effect of increasing dependence on cars and lorries for moving people and goods has been to disperse people and businesses. This has had a profound effect on urban structure, for example:

- the best paid have tended to move furthest, while poverty has tended to become further concentrated in the areas that are already poorest - 'social polarisation';
- dynamic industrial sectors have tended to invest in out of town locations leaving inner areas with an over-representation of sectors vulnerable to decline; and
- in retailing and personal services have tended to become concentrated in fewer locations, leaving those dependent on smaller centres with a poorer service.

These processes have plenty of scope to operate through turnover of the existing stock of buildings (over 90% of the housing market, for example, is second hand). However, over time, changes in the pattern of activity becomes reflected in the pattern of new development. A glance at a map shows how, over extended periods of time, the transport system has had a fundamental effect on the shape of urban areas and on the regional patterns of cities, towns and villages. At a personal level, dispersion combined with rising car ownership means that public transport becomes less viable and, without effective counter-action, those dependent on it suffer from deepening 'transport poverty'.

The interactions are essentially cyclical, with the consequences of each cycle feeding into the next, reinforcing and amplifying the trends either of growth or of decline within different parts of the conurbation and over the region as a whole. A vicious spiral of urban dispersion and decline can arise, in which transport mechanisms play an active part. Once established, the process is self-reinforcing, and has far-reaching economic, social and environmental consequences.

The scale of these problems is also a measure of the potential benefits flowing from a successful urban regeneration process. Even the brief review above demonstrates clearly that the components of the problems of urban decay interlock in a mutually reinforcing manner. It follows that a successful regeneration programme requires a multi-disciplinary, multi-dimensional approach, otherwise gains on one aspect will be negated by the continuing operation of countervailing forces or unexpected side-effects arising from others. In this complex web of interconnectivity, transport plays a wider role than is sometimes appreciated, even by transport professionals.

3. TRANSPORT AND ECONOMIC REGENERATION

Urban economic competitiveness is about achieving 'agglomeration benefits'. In urban areas generally the physical proximity of businesses and services facilitates interaction, enabling rapid and flexible responses to changing market conditions. This is of increasing importance in the light of the continuing shift of world trade towards rapidly changing 'global niche' markets served by opportunistic alliances between increasingly specialised producers. Other things being equal, the access to higher level services, specialised research capabilities and wide and varied labour markets of dense urban areas should allow them to respond to these economic conditions.

Transport actions are crucial if urban concentrations are to overcome the disadvantages of congestion and exploit their inherent economic advantages of scale and critical density. Transport can produce a positive impact on this central aim through a number of mechanisms:

- improved access to distant markets makes the area's outputs more competitive;
- accessibility within the area will be particularly important to local businesses forming part of supply chains;
- in addition to the effect on trade there is an effect upon investment; reliable access to markets and suppliers will encourage investment (inward and indigenous) in new products and processes, generating new opportunities for businesses already in the area, and facilitating structural change and adaptation;
- modern production industries depend upon sophisticated service inputs in financing, design and marketing; a dense urban area offers the potential for close interaction and the transport system has a clear and obvious role in allowing this potential advantage of concentration to be realised;
- a higher level service centre, such as a city centre, is a regional asset critical to obtaining export and investment benefits in production industries, but it too will have transport requirements to sustain its role; access to airports for international travel, to the capital and to other regional centres are crucial to the effectiveness of both services and advanced manufacturing sectors.

Consideration of the economic impact of transport should therefore take account of not only the immediate and direct effects on travellers, but also the efficiency impacts of the scheme's contribution to increasing (or reducing) the critical mass of the agglomeration.

4. TRANSPORT AND SOCIAL REGENERATION

The effects of increased locational choice are not socially uniform. Geographical social patterns are extraordinarily persistent over time in spite of constant movement of people in and out of deprived areas. This is because groups moving out of such areas tend to be the more successful of those there, while stayers and in-movers are those with the fewest alternatives. Wider locational choices eg those resulting historically from the impact of road transport therefore tend to reinforce pre-existing patterns of disadvantage. Unless other measures are taken to alter the balance, such as local housing and community economic development measures, the reservoir of deprivation is continually topped up.

A self-reinforcing combination of economic and social factors tends to funnel lower income households into certain areas and exacerbate the problems, for example:

- housing offered to people with urgent needs (low income, homeless, families with dependent children, etc) will mainly be in the least attractive areas with high turnover of property and vacancy;
- because of the concentration of tenants with high levels of need, such areas acquire reputations ('stigma') which reinforce lack of opportunity and social exclusion;
- concentration of need places strains on local public services and does not provide an attractive basis for local shops and private employers to prosper, so quality declines;
- low levels of participation and high unemployment mean there are few role models and information networks about job opportunities are limited; problems of crime and drug abuse are often significant; and
- more affluent groups and those who obtain employment leave.

Evaluation of outcomes therefore needs to take account of the distribution of appropriate measures of social deprivation, as well as changes in their overall level.

5. TRANSPORT AND ENVIRONMENTAL REGENERATION

Dispersion is both 'pushed' by the effect of traffic congestion on economic efficiency and quality of life in urban areas and 'pulled' by the promise of easier communications and a better environment in greenfield locations. The consequences are:

- increasing traffic congestion, air pollution, noise and severance have a direct negative effect on local health and quality of life, particularly in densely built-up neighbourhoods; and
- increased consumption of fossil fuels deplete finite natural resources and add to CO₂ output and the global greenhouse effect.

The pattern of peoples' housing choices can change quite markedly within the existing stock of dwellings. Similar changes can also take place in the commercial and industrial sectors as firms serve wider areas from fewer locations: while transport is not the only factor it is certainly a contributor. Because of this, controlling the amount and location of new development is insufficient to secure environmental sustainability.

While changes in the pattern of activity within the existing stock are (potentially at least) reversible, new development may lock-in a new, more car-dependent pattern. For example, the trend to car-borne weekly grocery shopping allows the major superstore chains to provide both low prices and very wide ranges of goods from relatively few outlets. This has led to the closure and re-use or redevelopment of many local shops which were more accessible by public transport and non-motorised modes.

Again, the measurement of environmental impacts should cover not only immediate physical measures, but also the contribution of a proposal to the creation of a sustainable pattern of activity in the longer term.

6. METHODOLOGIES - AN OVERVIEW

Effects of transport schemes may be considered at three levels:

- area-level (meso) effects, which spread out to influence the wider region;
- transport's contribution to the impact of programmes of linked initiatives at the local (micro) level, targeting the immediate area or client group; or
- regional (macro) impacts, not necessarily near the scheme itself.

Almost all schemes will have micro effects and all, even small schemes, will contribute through multiplier-type processes to macro effects. Macro and meso effects may be imperceptible for individual schemes, but extremely important for 'packages' of schemes. This is not simply a question of scale ie small scheme effects being too small to measure individually: more critically it is the consequence of mutual reinforcement between components. This may be between transport elements of a package, or between transport and other programmes. For example, the contribution of a training initiative in a target area to easing re-entry of unemployed residents to employment may be limited if car-ownership is low and there is no reliable public transport service to relevant job opportunities.

At the strategic level, the combination of many such smaller schemes can interact to produce much larger effects over a wide area. This is a long-term process, easily seen over an historical timescale but identifiable on a smaller scale over periods of a decade or less.

To be useful in practical terms, methodologies for predicting the impacts of schemes and strategies must satisfy a number of requirements:

- they must be appropriate in scale (cost, level of detail etc) for the activity being appraised;
- they must make use of data which is reliable and readily available; and
- they must be acceptable to the funding agency.

It is just as inappropriate to use an interactive strategic land-use transportation model for forecasting the impact of a single bus lane as it would be to suggest that the effect of a comprehensive strategy could be judged purely on its immediate effects on local traffic flows. As the scale of the proposed activity increases, and the timescale lengthens, the methodologies required become broader in their scope. It is important however not to lose sight of the contribution which each scheme (however small) makes to the achievement of strategic objectives and related benefits.

The impact of schemes and strategies has to be measured against a defined baseline. For the short-term analysis of scheme impacts, this would normally be the current situation, the 'base year' in transport planning terms. For strategy evaluation, however, the longer timescale and wider area of interest means that the baseline itself has to be predicted. In transport planning terms, this is the 'future base' scenario ie the conditions expected to occur in the horizon year in the 'do-minimum' situation. Where existing trends are generating negative impacts in terms of policy objectives, benefits from a strategy which reverses the trend can be much greater in the long term than the difference between the current situation and the 'with strategy' outcome.

7. EXTENDING BOTTOM-UP METHODOLOGIES

Most transport objectives can be represented in terms of outputs from a strategic transport model. For example, efficiency gains can be predicted in terms of time savings, and environmental improvement in terms of noise levels, derived from traffic forecasts.

Regeneration objectives are wider in their nature, and would require extension, to reflect the feedback effect of transport on land use, of the type of strategic model currently used in some major urban areas. To predict 'second-wave' effects on economic, social and environmental conditions requires a sophisticated approach in which the location of households and businesses, and the closely related decisions on car ownership, can themselves be influenced by the transport system.

Some of the regeneration effects that need to be considered are too small-scale (involve too few people or sites) for conventional predictive methods, designed to predict the behaviour of large groups, to be used. The only means available is to identify carefully the numbers of people and sites involved and present the probable impacts on them in a structured manner.

Larger-scale effects can be formally analysed using one or more models linking transport, land use and economic activity. These can be used to test major strategies, and the results can to an extent be generalised to estimate the effects of smaller schemes. Such models require a considerable investment to develop, although existing transport models provide a starting point.

Alternatively, some of these effects can be formally but less thoroughly analysed using simplified 'land-use change indicators' developed for use with existing transport models for various cities, including Edinburgh, Merseyside and Bristol. These provide a relatively quick and inexpensive, but limited, add-on to existing transport models. Different models are likely to be needed to look at the effects of within-area schemes and strategies and at inter-regional schemes. One such model has already been developed to look at inter-regional and international impacts.

Employment effects have not hitherto been taken explicitly into account in most scheme-specific evaluations. UK Government practice has been to treat these as 'below the line', partly because of the difficulty of measuring the effect which can be attributed to transport, and partly because of such issues as additionality (are the jobs genuinely 'new', or just transferred from elsewhere?). ERDF practice has been to require quantification of temporary and permanent jobs created, together with an estimate of the extent of transfer from elsewhere.

Direct job creation, whether temporary on construction work or permanent in operating the transport system, can be treated as pure gain, since it would not have occurred without the investment. It may be valued using relatively well-established techniques based on the resultant savings to the public sector. It is indirect employment creation (ie the number and value of new jobs attracted by the transport activity alone) which is more contentious. The problem can be much reduced by the packaging of transport activities with other complementary actions, which together can more justifiably claim credit for any resultant upturn in the area.

There are two possible approaches to the problem of predicting indirect employment impacts. At an aggregate level, for projects which have an impact over a large area, it may be possible to derive results from one or more models linking transport, land use and economic activity, or from simplified 'land-use change' indicators developed for use with existing transport models. Alternatively, or in parallel, a 'bottom-up' approach which applies multiplier relationships to local information on sites unlocked, numbers of hard-to-

fill vacancies, job opportunities made more accessible, and inward investment attracted by programmes, can be pursued.

Both European and UK urban and regional policy focus on areas of urban deprivation and, as discussed earlier in this paper, transport measures have an important part to play in this. It is important to note that, even if such measures were only to redistribute unemployment (for example) more evenly, this in itself would deliver a net increase in economic output. To the extent that transport measures contribute, a share of these economic benefits are attributable to it. There are a number of reasons for this effect:

- extremely deprived neighbourhoods do not attract market-provided services, increasing the tax burden for public provision on the rest of the economy;
- there is a direct cost on companies in terms of losses (theft, vandalism) resulting from social breakdown associated with extreme local deprivation, and increased costs of insurance and security measures; and
- there is a negative effect on the image of the city as a whole, reducing its attraction to investment and the agglomeration benefits arising (see below).

8. POTENTIAL FOR TOP-DOWN METHODOLOGIES

Analysis of the economic effects of transport strategies would not need to be repeated for each application for grant, but could provide a firm foundation for a policy framework within which each application is set. It could include:

- effects of the transport strategy on patterns of activity (and, in the longer term, development) in the area; and
- the resulting economic and social impacts of such land-use changes on target areas and social groups, and on the area as a whole.

As such, the analysis needs to relate to long-term change (at least 20 years) and overall strategies (not specific schemes), and to focus on the impact of strategies on specific groups, activities and areas within the population.

The assessment of 'second-wave' effects at a macro level rests initially on the identification of the effect of transport changes on land-use and activity patterns, compared with the baseline situation. The resulting net change in urban scale and density can then justifiably be translated into productivity gains resulting from what are termed 'agglomeration economies'. Some of these may accrue to suppliers and therefore improve the vitality of the economy, and some directly to consumers:

- improved access to specialised business services;
- labour market economies;
- larger supply of managerial and professional skills and facilities likely to attract such people;
- opportunities for specialisation offered by larger market;
- economies of scale in supply of utilities and public sector services;
- relative attractiveness for introduction of new technological facilities eg cable networks;
- increased opportunity for face-to-face contact;
- increased flexibility of use of buildings and facilities;
- presence of business entertainment facilities.

Results for individual industries and groups of industries indicate the likely distribution of such benefits: metal goods, services and especially distribution, hotel and catering industries appear to benefit particularly from increased densities. Benefits of increased city size per se are more widely distributed and are represented by an elasticity of labour productivity to city size, for which a range of values has been estimated.

In order to apply these techniques, however, it is first necessary to assess the contribution of transport activity to maintaining or increasing city size and density. The extent to which the transport system encourages dispersal or concentration of activity may be independent of the scale of direct benefits (time savings etc) of particular investments. Those activities which reduce congestion and travel costs to city centres and other major towns will tend to support their continued vitality. Other schemes which offer a similar level of benefit but to peripheral movement, will tend to encourage the drift of population and activities away from urban areas, with consequent loss of agglomeration economies.

Methodologies must therefore contain an explicit spatial dimension. Furthermore, effects are only likely to be measurable at the level of strategies or programmes, rather than individual schemes. Estimates of the impact of different strategies can be tested using a strategic transport model with an interactive land-use element, such as that being developed for the Greater Manchester by MVA, ITS and David Simmonds Consultancy.

9. DEVELOPMENT AND APPLICATION OF A NEW FRAMEWORK

The Merseytravel and Centro studies have provided an opportunity to develop new ways of looking at the effects that transport investment can and does have on the economic, social and environmental development of urban areas. At the time of writing, we are still developing the framework to be adopted in the West Midlands for appraising applications and as part of the annual review process for the ERDF investment programme. In Merseyside, however, we have been able to carry out some illustrative case studies using current projects, some of which are now under construction or indeed completed. The results of this exercise are shown in the table, which illustrates the way in which the conceptual framework suggested in this paper can be applied to identify direct impacts, transport's contribution to linked initiatives at a local 'micro' level, area-wide impacts through improved accessibility, and the contribution of even quite small schemes to the macro effects of a coherent strategy.

The case studies have drawn on previous work carried out during the MERITS study, using land-use indicators for area-wide effects, and on results of input-output analyses of Greater Manchester and Merseyside carried out at the University of Liverpool. Without these previous studies, it would have been difficult, if not impossible, to get as far as we have. This emphasises the fact that changing existing approaches in even a modest way requires the sort of analysis which is often not carried out at present.

The issues considered in this paper have greater significance now that the consensus that transport investment analysis should be based on 'predict and provide' has ended. Transport spending will have to be justified in future increasingly on the basis of its non-transport effects. The fact that some of the largest of such effects in the long term are still not fully understood means that they risk being excluded altogether from the decision-making framework. This not only greatly weakens the case for transport

investment in future by comparison with other types of programme, but also reduces the chances of success of urban regeneration and regional economic development efforts if they lack the necessary transport support.

This challenge requires a significant initiative in appraisal methodology to provide agreed ground rules for the treatment of non-transport effects, similar to the development in the early 1990s of the Common Appraisal Framework, which brought together the previously disparate methodologies used for the appraisal of the transport impacts of different modes. This paper is offered as a contribution to getting that initiative under way.

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	Mersyside Rapid Transit (Corridor 2W)	New Railway Stations (Conway Park, Birkenhead, Brunswick and Wavertree Technology Park, Liverpool)	Wirral SMARTbus (two routes radiating from Birkenhead)	Supported Bus Service (one route north of Liverpool City Centre)	Improved bus stops (17 new bus shelters and associated information, in Speke/Garston area)
Direct impacts	1350 person-years direct employment, plus multiplier effect of 1050 person-years; employment in operation balanced by losses in bus jobs	20 to 200 person-years direct employment, depending on scheme; 3 to 12 permanent jobs per station	Very little employment in construction. No new jobs in operation.	No construction involved (stops provided in advance by Development Corporation). Probably some jobs in operation.	Some work in manufacturing, installing and maintaining shelters and information displays.
Possible linked initiatives	Encourage unemployed persons in corridor to seek jobs accessible via MRT	Two of the stations are in, and the other adjoins, major redevelopment sites; stations should promote these	Very limited scope.	Very limited scope, except in relation to bus stops (see right).	Scope for <ul style="list-style-type: none"> townscape improvements (including easy access to stops) public transport information/promotion
Area-wide impacts	Estimated to help increase employed population by approx 400; possibility of slight positive feedbacks encouraging social and physical regeneration	Conway Park: may assist Birkenhead to compete with Liverpool. Brunswick: should help residents to reach work and businesses to attract labour	Estimated to lead to an increase of 100 to 150 residents in work in the two corridors.	In this particular case, some benefit to businesses (easier for employees to reach work); very few residents to consider	Very little effect, except through contribution to providing a quality public transport system to the area
Macro effects	Contribution to image and environment	General contribution to environment (especially with electric railways); possible advantage to image if all key destinations directly served by rail	Image and environmental effects (note particular benefit of developing a high-quality, "green" image for bus)	Very modest contribution.	Modest contribution to image and environmental effects.

NOTES

¹ Merseytravel (1997) *'A Study into the Impact of Public Transport Schemes on the Social and Economic Regeneration of Merseyside'*

² Centro and West Midlands Local Authorities (1997) *'ERDF Transport Study'*

