

Evaluation of Barriers to Sustainable Transport in Ireland and Potential Policy Options

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ABSTRACT

The objective of this paper is to evaluate barriers to sustainable travel and transport in Ireland as well as potential policy options. In addition, the paper reviews the results of an on-line survey, which was submitted to local authorities in Ireland in order to evaluate (a) their perceptions of barriers to sustainable travel and transport and (b) their perceptions of potential policy measures. This was undertaken in order to evaluate sustainable transport from a local authority perspective and to validate or otherwise the results of the desktop barrier analysis and evaluation.

It was found that the general perception of local authorities was that local public transport, cycling and walking facilities were inadequate and that the major barriers to public transport and cycling infrastructure provision were physical, i.e. inadequate economies of scale for public transport services and insufficient road space for cycle paths. In terms of overall barriers to sustainable transport, it was found that the most significant barriers are (i) lack of alternatives; (ii) resource constraints on local authorities and agencies; and (iii) physical constraints.

The main policy priorities that were identified from the local authority survey, in order of priority, include: (i) education and awareness; (ii) investment in cycling and walking infrastructure; (iii) improved public transport services; and (iv) balanced regional development and spatial planning. It was concluded that these results offer a useful insight from a professional perspective into sustainable transport priorities at a local authority level. However, they could be complemented by further research into the perceptions and attitudes of the general public or particular stakeholders in order to develop more empirical evidence. The approach presented in this paper could easily be adapted and applied by policy-makers in other jurisdictions.

INTRODUCTION

The objective of this paper is to evaluate barriers to sustainable transport in Ireland as well as potential policy options. In addition, it presents the results of an on-line survey submitted to local authorities in Ireland illustrating their perceptions of local barriers to sustainable transport and potential policy priorities. This survey was carried out as part of a wider project on assessing the barriers to sustainable travel and transport in Ireland as well as potential policies, which could help ensure that the transport system in Ireland evolves along a more sustainable trajectory.

Ireland has 34 local authorities, which are responsible for a wide range of issues, such as housing, waste management and local transport planning. Local authorities have an important role in delivering sustainable transport by *inter alia* (i) allocating resources according to project and policy priorities; (ii) implementing national legislation and guidelines at a local level through development plans and local area plans (LAPs); and (iii) encouraging sustainable travel through mobility management and traffic calming measures such as reduced speed limits in urban areas and urban design. Thus, it is useful to evaluate what the local perceptions and barriers might be both in terms of determining a bottom-up approach to sustainable transport evaluation and focussing decision-makers on policy priorities within their local jurisdiction.

LITERATURE REVIEW

Tricker and Hull (1) carried out a similar study as part of the UK DISTILLATE (Design and Implementation Support Tools for Integrated Local Land-use, Transport and Environment) Research Programme. This study involved a questionnaire study, which was completed by officers from transport planning authorities who were involved in the delivery process for sustainable local surface transport solutions (SLTS) (1). It was found that funding, modelling, monitoring and evaluation, strategy option generation and strategic appraisal were the most problematic barriers to the delivery of SLTS (2).

Tricker and Hull (1) identified 79 factors or barriers within the delivery process, with 46% of barriers identified as organisational, 25% as external and 29% as technical in nature. Individual barriers were assigned a rating based on 'level of seriousness for barrier' with a maximum value of 1. Barriers with the highest ratings include (i) lack of funding for operational subsidies; (ii) pressure on staff time and resources in delivery; (iii) insufficient resources to develop models; (iv) availability of skilled/technically expert staff; and (v) public acceptability of restraint-based policy instruments (1).

Tricker (3) reviewed over 25 studies, which broadly looked at barriers to sustainable transport solutions and identified the major barriers using a typological classification, including difficulties in achieving integrated delivery and joined-up governance, external limits to action and strategy and technical opportunities in aiding delivery. ECMT (4) identified a number of barriers to the implementation of sustainable urban travel policies, including (i) lack of a national policy framework; (ii) poor strategy formulation; (iii) poorly joined-up government; (iv) inadequate stakeholder involvement and policy acceptance; (v) lack of political commitment; (vi) analysis and data quality; (vii) poorly channelled financial streams; (viii) public transport financing sources; (ix) inappropriate pricing/fiscal framework; and (x) unsupporting legal/regulatory framework.

Banister (5) argues that barriers to sustainable transport can be divided into seven main categories, including:

1. Financial or physical resource barriers, e.g. insufficient resources for funding agencies or costs for consumer or industry;
2. Technical barriers, e.g. commercial availability, technical feasibility, etc.;
3. Institutional and policy barriers, e.g. sectorization of policy-making, opaqueness of responsibility, inertia, lack of accountability or a political champion, etc.;
4. Socio-cultural barriers or failure to attract public acceptability;
5. Legal barriers, e.g. where a particular measure may be *ultra vires* and requires statutory or constitutional change or where legal challenges cause delays in policy implementation;
6. Policy failures, including unanticipated side-effects or unintended consequences; and
7. Physical barriers, e.g. space restrictions in urban areas, area topography, etc.

Potential barriers, which may undermine the public or institutional acceptance of a proposed policy include: (i) incomplete information and lack of awareness of alternative options; (ii) perceived lack of effectiveness and efficiency; (iii) the means of revenue allocation, e.g. hypothecation of revenue for public transport investment or reduction in income tax may increase public acceptability; and (iv) perception that the method is inequitable. Thus, it is imperative that the public understand the objective of a projected measure, the background, the aims and how the measures are implemented in practice and (are satisfied as to its fairness and effectiveness. Banister (5) concluded that successful policy implementation requires leadership and a commitment to change, particularly where there are many potentially conflicting interests, extreme complexities and uncertain outcomes.

Key steps to ensure that sustainable transport policies are acceptable, effective, and equitable include (5):

1. A long-term policy framework, which integrates spatial planning, transport investment and housing policy;
2. Appropriate national, regional and local governance and institutional structures;
3. Clear, consistent and transparent policy signals;
4. Empirical research in order to determine the likely outcomes of potential transport policies;
5. Communication, public participation, stakeholder consultation, education and awareness-raising in order to ensure public acceptability of measures; and
6. Temporary or permanent exemptions, where necessary, for certain commercial operators and lower socio-economic groups, whilst ensuring fairness and equity for all network users.

Banister and Marshall (6) undertook an empirical investigation of barriers to policy measures and found that resource barriers occurred most frequently, followed by institutional/policy and socio-cultural barriers. Hull and Tricker (2) found that the most important external challenge was inadequate operational subsidies, followed by market regulation of transport operations, public acceptability of restraint-based instruments, contradictions between national policy objectives and short-termism in political decision-making. Other relevant studies include Atkins (7); Vigar and Stead (8); Rietveld and Stough (9); and Foxon et al. (10).

Tricker and Hull (1) offer a framework for the assessment of barriers in the delivery process for sustainable transport policy, including (i) barrier identification; (ii) barrier analysis, e.g. identification of organisational obstacles within local authorities, funding and implementation mechanisms and parameters/constraints

defined by external factors; and (iii) identification of levels in the policy process, e.g. strategy development, scheme design and operation.

METHODOLOGY

This research initially involved identifying and evaluating barriers to sustainable transport and potential policy options using a desktop study and literature review, with specific focus on barriers and policies in the Irish context. Barriers that were identified in this study were evaluated under a number of headings, including:

- (a) Timeline, e.g. short-term, medium-term, long-term. This relates to the potential timeframe within which the particular barrier could be overcome and the appropriate policy actions taken;
- (b) Level of subsidiarity, e.g. international, European Union (EU), national, regional, local authority, etc. This step involves identifying the appropriate vertical administrative levels for policy implementation;
- (c) Type of policy measure required, e.g. fiscal, technical, regulatory or legal, guidelines, education and awareness;
- (d) Actor. This step involves identifying the appropriate institutional actors and stakeholders, which are likely to take the relevant action;
- (e) Specific relevance to Ireland. This relates to measures that can be dealt with within this jurisdiction and by Government or local authorities, that is over which policy-makers have autonomy to make decisions; and
- (f) Significance, e.g. highly significant, quite significant, low significance and not significant. Significance was evaluated according to whether the particular barrier is likely to be an obstacle to delivering sustainable transport, depending on the particular type of action. Because there is no common parameter, this is by nature a subjective evaluation.

This typology allows policy-makers to decide which barriers should be tackled initially and provides a framework for concerted action over the medium- to long-term. Sustainability appraisal was used to qualitatively analyse individual policies or 'policy bundles' and to develop an impact matrix. A number of criteria were used in the sustainability appraisal, including: (i) net additional cost to consumer; (ii) net additional cost to Exchequer; (iii) modal shift; (iv) reduction in greenhouse gas (GHG) emissions; (v) impact on rural communities; and (vi) impact on lower socio-economic groups. In addition, potential policy options were evaluated on the basis of (a) type of policy measure required, e.g. fiscal, technical, regulatory or legal, guidelines, education and awareness; and (b) timeline, e.g. short-term, medium-term, long-term.

The barrier and policy evaluation stages were corroborated and validated by consultation with local authorities. This was done by issuing an on-line questionnaire, which was sent to representatives of the Local Authority Sustainable Travel Officer Network in the 34 local authorities in Ireland in order to evaluate their assessment of barriers to sustainable transport and policy priorities within their local jurisdiction. Twenty-two responses were received, which illustrates a response rate of almost 65%. Respondents were asked to give an opinion on a series of questions relating to 'level of importance' of barriers to sustainable transport and potential policies, with options including 'not important', 'somewhat important', 'important' and 'very important'.

RESULTS

Following the initial desktop literature review, the main barriers to sustainable transport in Ireland were broadly classified in this research as:

1. Barriers to modal shift;
2. Barriers to travel demand or mobility management;
3. Barriers to integrated transport and more efficient institutional arrangements;
4. Barriers to alternative fuels and technologies;
5. Barriers to fuel economy; and
6. Barriers to behavioural and cultural change.

Barrier priorities were identified as those that (a) can be dealt with in the short-term by national or local policy-makers, (b) are relevant in terms of an Irish policy context and (c) are highly significant. Thus, *short-term* barrier priorities that were identified include:

1. Inflexible bus services, e.g. urban commuter services tend to be radial and predominantly serve the city or town centres whereas employment clusters are increasingly located in suburban or peri-urban locations or on the periphery of metropolitan city-regions; and
2. Potential public transport users may be deterred by a perception of poor service quality both on-board and at waiting facilities, e.g. in terms of crowding, safety, comfort or cleanliness.

Medium-term barrier priorities that were identified include:

1. Operational subsidies allocated to State public transport operators are comparatively low relative to similar EU Member States. In addition, network users lack accessible or real-time passenger information on bus arrival times, which may exacerbate perceptions of unreliability or lack of punctuality;
2. Some cycle paths are badly designed or may not be contiguous or integrated in a seamless manner, e.g. discontinuous cycle lanes may end abruptly onto a busy road or adjoin parked vehicles;
3. There is a perception that cycling and walking are unsafe and potentially hazardous, particularly on rural roads and in urban centres, as a result of high speed limits, aggressive driving behaviour and increasing traffic volumes.
4. Structure of vehicle and fuel taxation, i.e. where the fixed costs of vehicle ownership, in terms of vehicle registration tax (VRT), motor tax and insurance, are relatively high, whereas the variable costs of usage are relatively low;
5. Insufficient affordable or suitable high-density housing in urban areas, particularly for multiple-person households. This is related to a perception that apartment housing is unsuitable for families with children as well as issues such as poor apartment design, lack of amenities and green space, anti-social behaviour in urban areas, air pollution, congestion and noise in urban areas and limited floorspace;
6. Failure to implement planning and/or housing guidelines coupled with a traditionally more liberal approach to planning and zoning in Ireland, e.g. in the case of one-off housing and urban sprawl;
7. Availability of alternative fuels and vehicles (AFVs), e.g. there are limited ranges of battery electric vehicles (BEVs) or plug-in hybrid electric vehicles (PHEVs) currently available for sale;
8. Lack of home or on-street charging points for BEVs and PHEVs. Rollout of charging points may also be hindered by technical challenges, particularly with apartment blocks or where off-road parking is not available;

9. Low excise rates or fluctuating market price for fossil fuels, which acts as a disincentive to more fuel-efficient vehicles or eco-driving and sends inconsistent market signals;
10. Political reluctance to introduce lower speed limits due to concerns over public acceptability, costs associated with signage and enforcement, perception of futility where some motorists fail to adhere to existing speed limits, commercial resistance and fears of loss of competitiveness; and
11. Lack of awareness of the social, economic or environmental effects of travel and transport among the general public and, in particular, in relation to domestic and short-haul air travel.

Long-term barrier priorities that were identified include:

1. Public transport or cycling facilities may not be available or there may be limited network coverage, particularly in rural areas and low-density urban areas. This may result in consumer inelasticity to price increases, particularly where travel patterns are locked-in to long-term commuting or where local services or employment opportunities are not available;
2. Rail freight and intermodal freight transport may not be suitable for some journeys currently undertaken by road, for example due to (i) lack of available rail links, (ii) inflexibility of rail freight or intermodality, (iii) inconvenience or cost of multi-stage freight patterns and (iv) complexity of logistics chains. In addition, significant investment and political commitment would be required to provide a comprehensive rail freight network and to renew rolling stock;
3. Concerns over the impact of fiscal measures, for example (i) on the price of motoring, (ii) loss of Exchequer tax receipts from fuel tourism, (iii) fears over a loss of national competitiveness by unilaterally introducing fiscal measures, particularly in terms of road freight and (iv) concerns over the equitable impact on lower-income groups or rural communities;
4. Failure to provide for balanced regional development and critical mass in urban city-regions outside the Greater Dublin Area (GDA);
5. Historic urban sprawl, which may result in difficulties in retrofitting sustainable transport solutions, particularly in low-density suburbs or rural areas which do not have the critical mass to support public transport, cycling and walking;
6. Infrastructural challenges for AFVs, i.e. the 'chicken and egg' scenario associated with developing infrastructure where demand does not yet exist; and
7. Prestige, cultural symbolism and status associated with vehicle ownership, particularly in relation to certain makes and models which confer perceived safety or image benefits. This is intrinsically related to social expectations and norms, particularly among certain income groups and demographics.

Survey recipients in local authorities were asked whether local public transport services were adequate in their area and it was found that 100% of respondents indicated that local services were inadequate. Figure 1 indicates that the primary barrier to public transport provision in local authority areas was perceived to be low urban density or insufficient economies of scale, followed by a lack of incentives for potential market entrants. The most insignificant barrier was perceived to be restrictions on competition by private operators. The issue of density is important, particularly in rural areas where services may not be feasible or cost-effective. Thus, public transport should be concentrated in areas where there is sufficient demand or critical mass.

FIGURE 1 Local authority perceptions of barriers to public transport provision

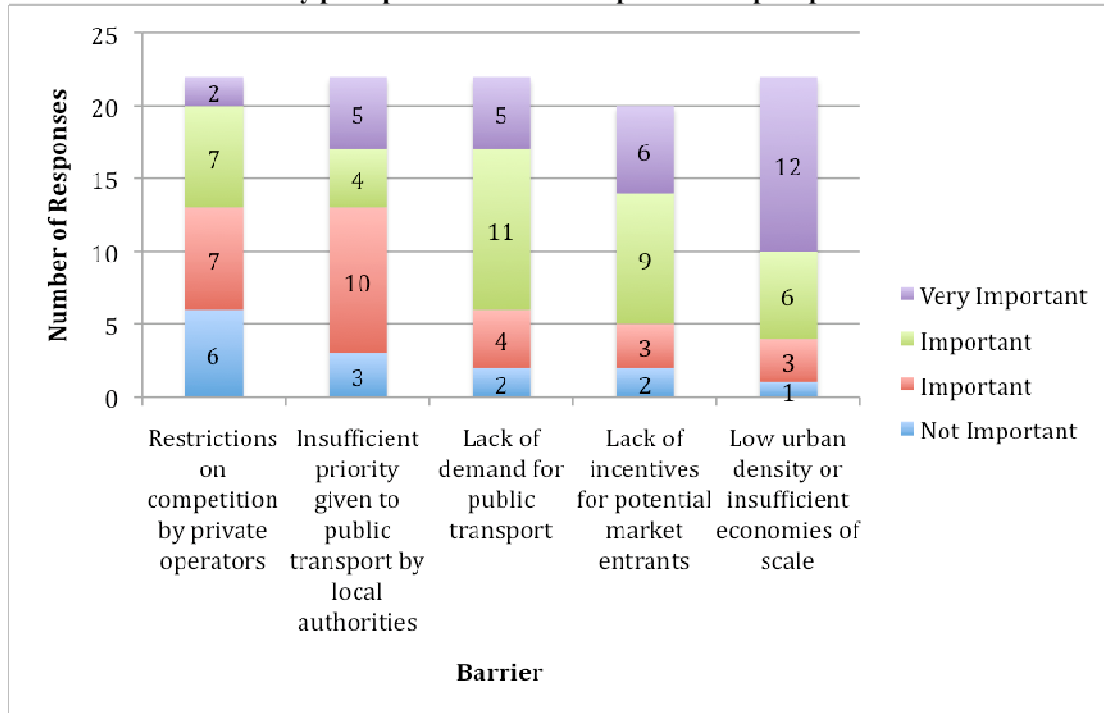
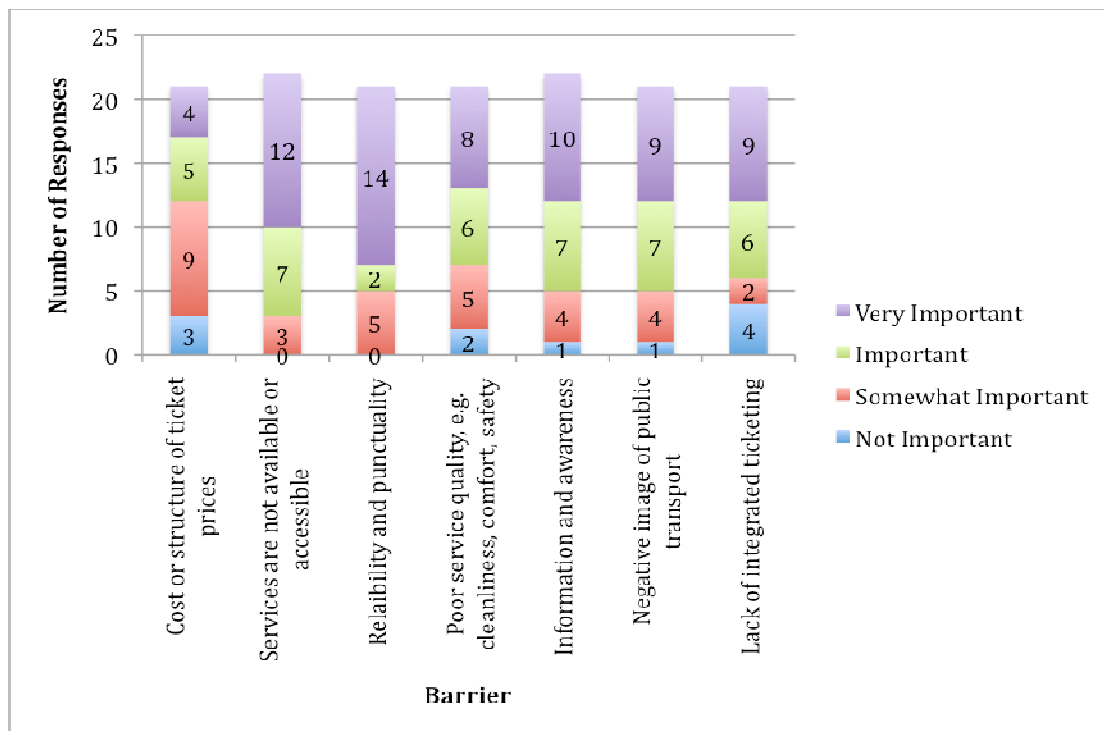


Figure 2 collates responses from local authorities on barriers to public transport use and indicates that perceptions of unreliability and unavailability of services were perceived to be the primary barrier, followed by unavailable or inaccessible services. The most insignificant barrier was perceived to be cost or structure of ticket prices.

FIGURE 2 Local authority perceptions of barriers to public transport use



With regards to local authority perceptions of the adequacy of cycling and walking facilities in their jurisdiction, it was found that 86.4% of respondents indicated that local facilities were inadequate, with 13.6% of respondents indicating that they were adequate. Figure 3 collates local authority perceptions of barriers to cycling and walking and indicates that a lack of suitable road space, followed by the perception that cycling and walking are unsafe and the cost of developing a cycle network are the primary barriers. The most insignificant barrier was perceived to be a lack of fiscal incentives for potential cyclists and pedestrians. It is possible that these results might differ if potential users were surveyed, as it would be expected that the primary barriers would include physical barriers and lack of on-street or parking facilities, based on the desktop review.

FIGURE 3 Local authority perceptions of the barriers to cycling and walking

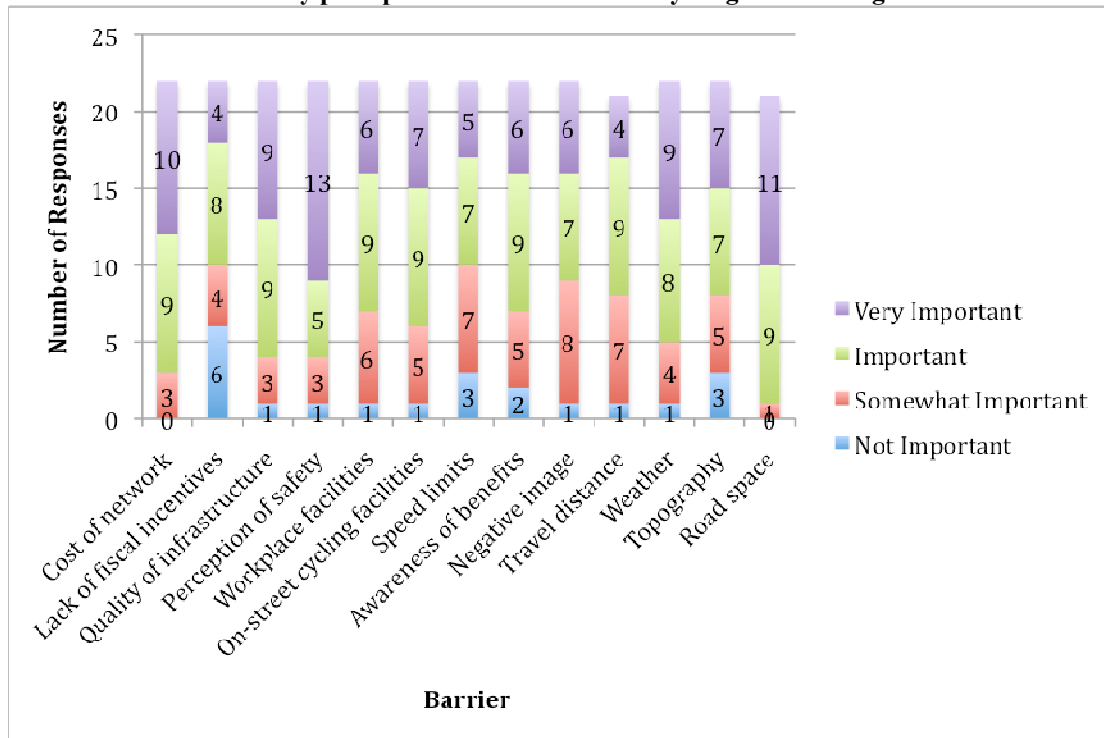


Figure 4 collates local authority perceptions of barriers to mobility management and indicates that a lack of awareness by employers or organisations and lack of interest or pressure from employees are the primary barriers, while lack of detailed technical guidance was perceived to be the least significant barrier.

FIGURE 4 Local authority perceptions of barriers to mobility management

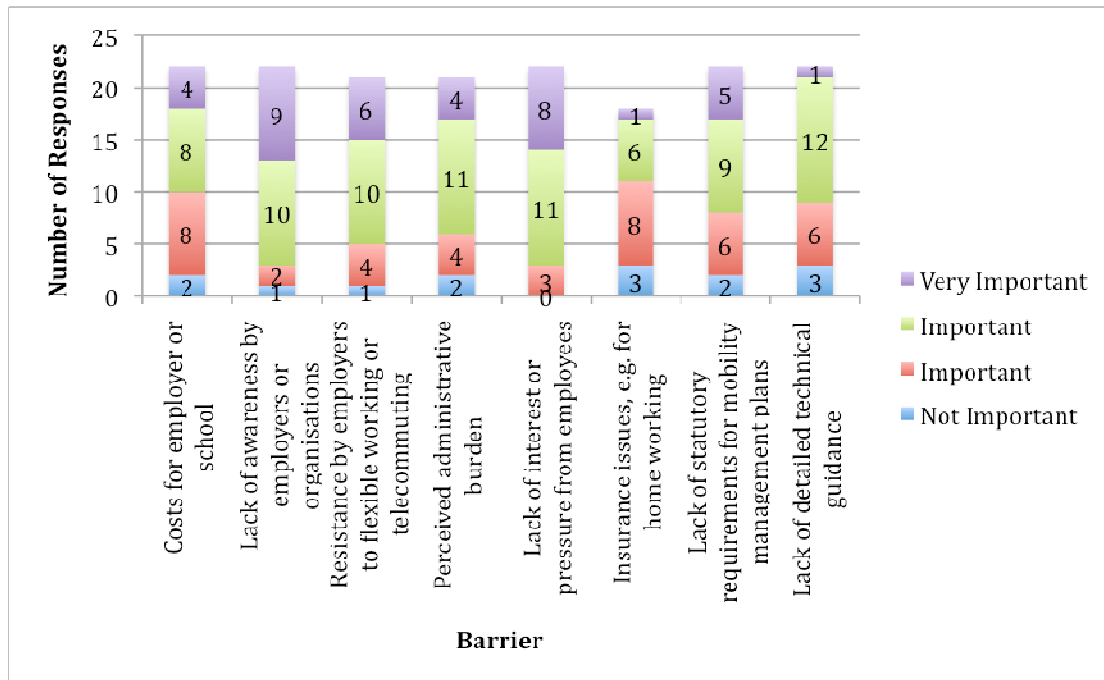


Figure 5 collates local authority perceptions of barriers to sustainable residential development and indicates that difficulties in retrofitting sustainable transport solutions, particularly in low-density urban and rural areas, were perceived to be the most important barrier, followed by the legacy of one-off housing and urban sprawl. Relatively low commuting costs were perceived to be the least significant barrier.

FIGURE 5 Local authority perceptions of barriers to sustainable residential development

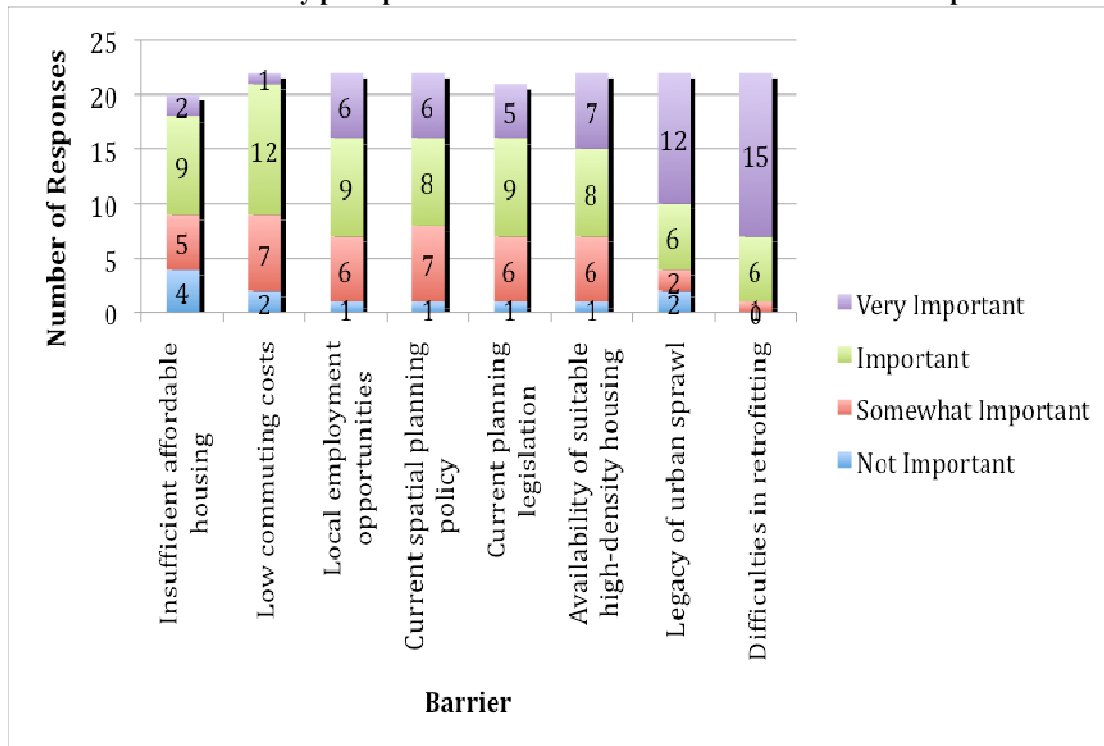


Figure 6 collates local authority responses to barriers to integrated transport and indicates that resource and time constraints on local authorities and a lack of political commitment were perceived to be the most significant barriers. A lack of technical guidance on policy integration was perceived to be the least significant barrier.

FIGURE 6 Local authority perceptions of barriers to integrated transport

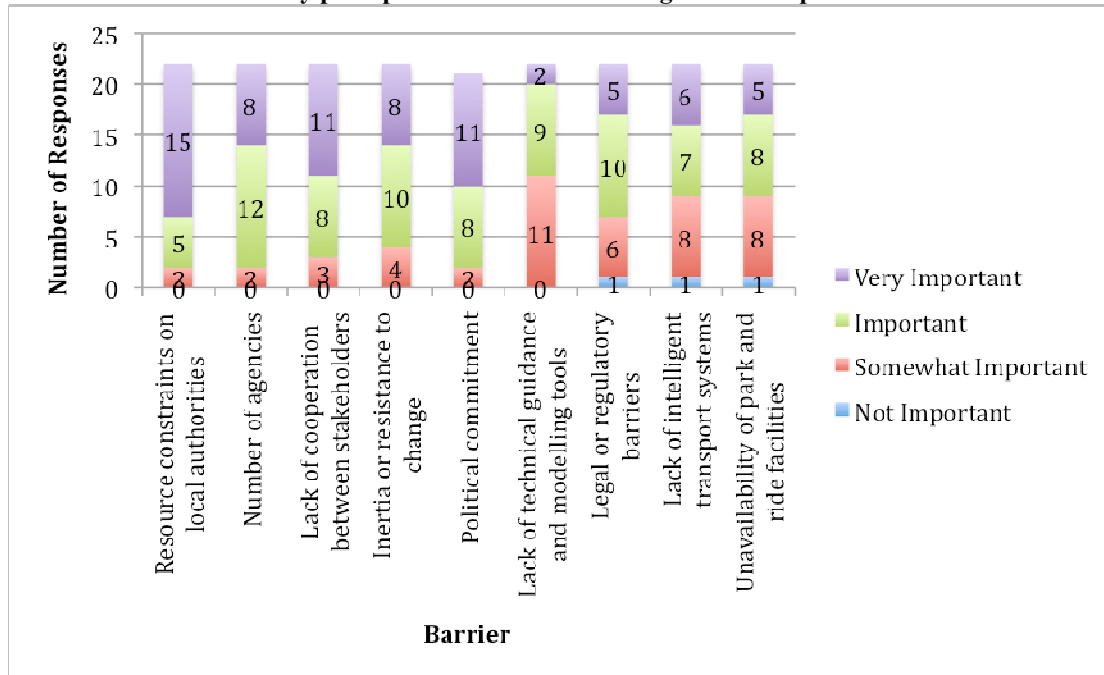
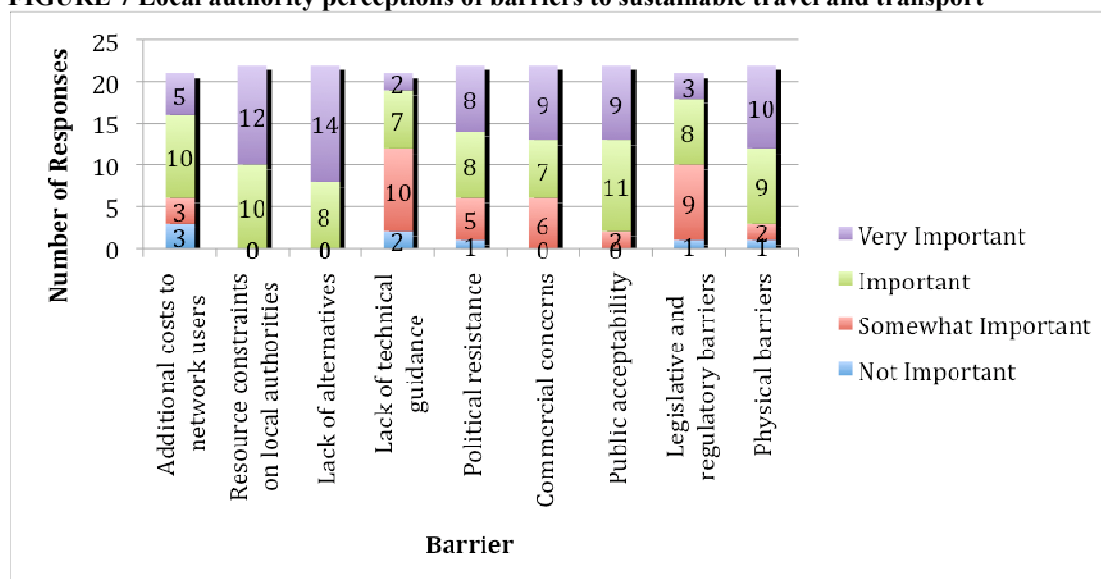


Figure 7 collates local authority responses in relation to their overall impression of barriers to sustainable travel and transport in their local areas. It can be seen that a lack of alternatives, e.g. public transport, cycling and walking facilities, was perceived to be the most significant barrier, followed by resource constraints on agencies and local authorities. A lack of technical guidance and modelling tools was perceived to be the least significant barrier.

FIGURE 7 Local authority perceptions of barriers to sustainable travel and transport



Potential policy recommendations were evaluated in the desktop study on the basis of cost and impacts and were disaggregated according to short-term, medium-term and long-term policy options. Thus, policy priorities are those which:

1. Can be introduced in the short-term by national or local policy-makers;
2. Are low cost or result in a reduction in cost to the consumer;
3. Are low or medium cost to the Exchequer or have no additional cost;
4. Can deliver high or medium modal shift and reduction in GHG emissions; and
5. Have a positive or neutral impact on lower socio-economic groups and rural communities.

Thus, *short-term* policy priorities that were identified include:

1. Complete national network analysis review of all public transport services supported by market segmentation, consumer-focussed research and customised advertising in order to identify priorities for network improvements, i.e. reallocation of services, increases in service frequency, more flexible and efficient services and improvements in service quality;
2. Financial incentives such as free public transport fares at peak hour, restructuring of benefit-in-kind taxation and cash-out payments by employers for using public transport, cycling or walking to work;
3. Provision of grants to encourage freight modal shift from road to rail and/or inland waterways, use of intelligent transport systems (ITS) to improve road freight efficiency, enforcement of road haulage regulations and clarification of legal restrictions or anomalies;
4. Reducing or decommissioning car parking spaces at workplaces and in urban centres with the public sector providing an exemplar role;
5. Incentives and support for e-working, flexible working or telecommuting, particularly for public sector employees;
6. Statutory residential housing density guidelines and technical statutory guidelines on high-density or apartment development to ensure that they are 'fit for purpose' and suitable for multi-person households;
7. Development of an on-line and mobile phone-accessible national travel information portal, which integrates all modes of transport and offers real-time

- information on public transport services, lift-sharing options and cycling and walking network information;
8. Fiscal incentives for AFVs, e.g. VRT and motor tax relief, grants or subsidies, free parking, staggered payment schemes, free trial periods or discounted loans for potential purchasers of BEVs and HEVs;
 9. Modification of the vehicle taxation system to ensure that fuel-efficient vehicles are further incentivised, e.g. by increasing the rates for higher emission bands and introducing a system for the second-hand vehicle market. This should consider the potential for removing perverse incentives, which might favour older diesel vehicles;
 10. Rigid enforcement of existing speed limits coupled with speed awareness campaigns which highlight the environmental and fuel cost saving benefits of lower speed limits;
 11. Inclusion of eco-driving in the Rules of the Road and driving test as well as mandatory lessons on eco-driving for public transport operators; and
 12. General sustainable travel awareness programmes and targeted campaigns, highlighting the economic, social, environmental and health benefits of 'active travel'.

Medium-term policy recommendations include:

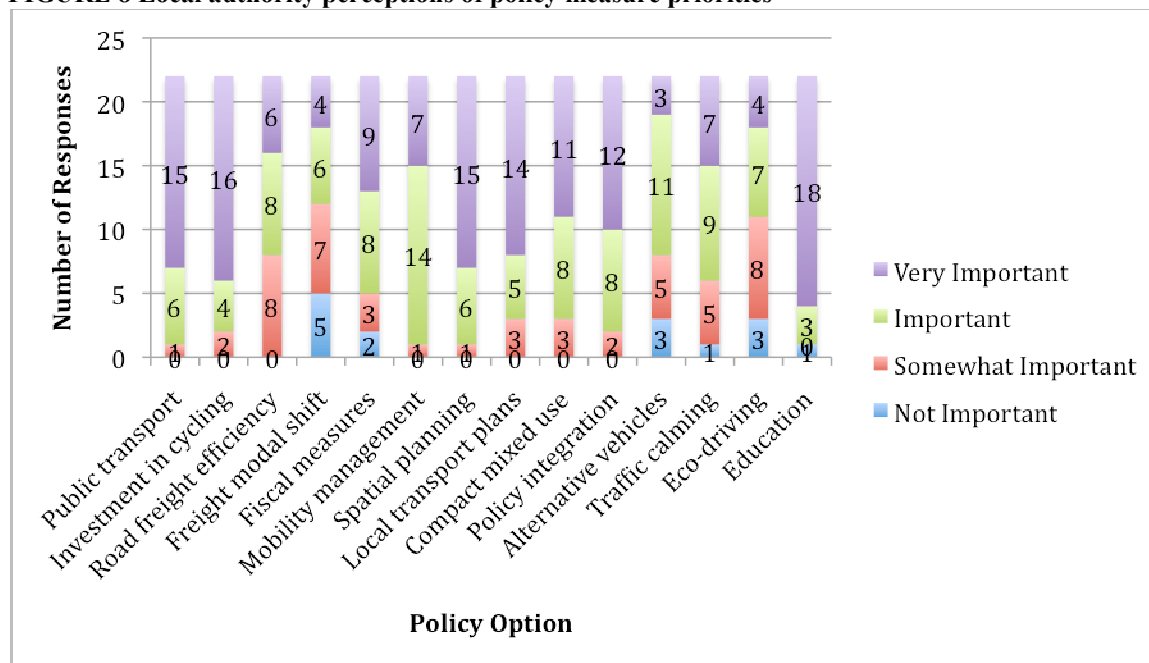
1. Improvements in existing cycling and walking infrastructure and development of dedicated segregated cycle paths in urban areas and along rural roads. These should be informed by local authority audits of all cycling and walking networks, in accordance with the recommendations set out in the 2009 National Cycle Policy Framework (NCPF) and the proposed National Walking Policy;
2. Workplace parking levies in all urban areas, starting initially in the major centres where there are public transport services available;
3. Development of technical guidelines and information awareness packs on 'soft support measures' as well as facilities such as mobility management and regional e-working centres for employers, particularly in the small to medium-sized enterprise (SME) sector and mandatory workplace travel plans for large organisations;
4. Promotion of school travel plans (incorporating cycle training for schoolchildren), personalised travel planning, bicycle education programmes and travel blending;
5. Review of current spatial planning and housing policy guidelines in order to evaluate the effectiveness of the National Spatial Strategy (NSS) and regional planning guidelines (RPGs) and to ensure that guidelines are more closely adhered to;
6. Integration of mandatory local transport plans (LTPs), incorporating public transport accessibility, cycling and walking, with development plans and LAPs;
7. Restrictions on one-off housing, out-of-town retail centres and ribbon development to ensure that urban sprawl is mitigated and transport demand reduced;
8. Development of regional transport and land use strategies and institutional arrangements to complement proposals for the GDA;
9. Rollout of EV charging and AFV refuelling infrastructure at optimal locations, including on-street charging, along motorways and national roads and near high-density residential neighbourhoods and workplaces. This should be supported by market advertising and demonstration programmes by both industry and Government to ensure that AFV incentives are fully advertised and public awareness is increased;
10. Lowering of speed limits on motorways, national roads and in urban areas; and

11. Free eco-driving courses and grants for fuel economy meters.

Long-term measures tend to incur greater cost for the Exchequer and may involve substantial investment in infrastructure or supply-side services. However, they also have the potential to yield significant GHG emissions reductions. Long-term policy recommendations include:

1. Extension in rural public transport services and improved accessibility to services, particularly in rural areas;
2. Completion of infrastructural projects under the current capital investment programme Transport 21 and preparation for capital investment beyond the lifetime of the current investment programme;
3. Development of a National Cycle and Walking Network, incorporating commuting, leisure and tourism routes;
4. The vehicle and fuel taxation system should be restructured or calibrated so that fixed costs and environmental, economic and social externalities are internalised into a 'pay-by-use' system such as nationwide road pricing where charges may be levied according to network use on the basis of levels of congestion, vehicle size, emissions class, type of road, geographical location and time of day. Alternatively, consideration could be given to developing a carbon trading system, such as personal carbon trading (PCT) or Cap and Share or including road transport in the EU Emissions Trading System (ETS). This could be supported by the promotion of 'green insurance premia' with discounts for fuel-efficient vehicles and/or reduced vehicle use and feebates for more efficient vehicle use and purchasing patterns;
5. Promotion of balanced regional development and creation of strong local economies;
6. Guidelines and grant schemes for local authorities for retrofitting of residential neighbourhoods and urban centres;
7. Provision of more social and affordable housing in urban areas and restrictions on land speculation; and
8. Mandatory vehicle import targets for AFVs and forced early retirement of older or less fuel-efficient vehicles, e.g. through scrappage schemes or the National Car Test (NCT).

In addition, local authorities were asked whether they felt there was potential for significant modal shift. It was found that 90.9% of respondents felt that there was potential for significant modal shift in their local areas, with 9.1% of respondents indicating that there was not. Figure 8 collates local authority perceptions of policy priorities and it can be seen that the main policy priorities that were identified include: (i) education and awareness; (ii) investment in cycling and walking infrastructure; (iii) improved public transport services; and (iv) balanced regional development and spatial planning. Policies, which were judged to be of lesser priority, include (i) freight modal shift from road to rail or inland waterways and (ii) promotion of eco-driving.

FIGURE 8 Local authority perceptions of policy measure priorities

DISCUSSION

The results presented in this paper represent the findings of a desktop literature review and evaluation of barriers to sustainable transport in Ireland and policy options. In addition, perceptions of local authorities are presented in order to provide a supporting analytical perspective. It was found that the most significant barriers to the delivery of sustainable transport at the local authority level are a lack of alternatives, e.g. public transport, cycling and walking facilities, followed by resource constraints on agencies and local authorities. This correlates with, for example, the findings of Banister and Marshall (6) who found that resource barriers occurred most frequently, followed by institutional/policy and socio-cultural barriers and Tricker and Hull (1) who found that resource and time constraints were significant barriers at a local authority level.

It should be noted, however, that the results presented here represent the individual views of professionals working within local authorities and who are familiar with sustainable transport concepts. It is possible that some of the responses may vary depending on the study group, e.g. a particular focus group or industry representatives, geographical location or income class. For example, with regards to barriers to cycling and walking, it was found that a lack of suitable road space, followed by the perception that cycling and walking are unsafe and the cost of developing a cycle network are the primary barriers. However, it is probable that public responses might indicate that perceptions of safety or distance are the primary barriers.

It is argued that the approach presented in this paper is a useful means of identifying and evaluating barriers to sustainable transport as well as potential policy priorities from a local authority perspective. This is important in order to (a) guide national policy development and (b) focus on local and regional policy priorities. It is also a useful framework for local authorities to focus on key goals and objectives where resources are limited or where significant barriers are external in nature rather than following an ad-hoc approach to delivering sustainable transport.

This approach can be used to complement cost-effectiveness analysis (CEA) or as an input to multi-criteria decision analysis (MCDA) in order to identify policy priorities. It can also be used to infer causal relationships between barrier identification and policy implementation based on the stage model of implementation, although, in reality, transport policy is more likely to involve a less systematic approach based on a merging of incremental multiple actions along a continuum, with interdependence and feedback between stakeholders (11) (12). Further work could include surveying public attitudes and focus groups in order to develop an overall perspective of barriers and policy priorities.

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REFERENCES

1. Tricker, R.C., Hull, A.D. An assessment of the barriers to the delivery of sustainable local surface transport solutions. 2005. In *European Transport Conference (ETC) Proceedings*
2. Hull, A.D., Tricker, R.C. Assessing barriers to sustainable UK urban transport solutions. 2004. *Proceedings of the Institution of Civil Engineers, Engineering Sustainability* 158
3. Tricker, R.C. *Review of available evidence on the barriers in the delivery of sustainable transport solutions*. 2005, University of the West of England (UWE)
4. European Conference of Ministers of Transport (ECMT). *Assessment and decision-making for sustainable transport*. 2004. OECD, London
5. Banister, D. Overcoming barriers to the implementation of sustainable transport. 2005. In: Rietveld, P., Stough, R.R. (Ed.), *Barriers to Sustainable Transport: Institutions, Regulation and Sustainability*, Spon Press
6. Banister, D., Marshall, S. *Encouraging transport alternatives: good practice in reducing travel*. 2000. Stationery Office: London
7. Atkins. *Local transport plans – policy evaluation: part 1 – final report*, DfT, London
8. Vigar, G., Stead, D., 2003. *Local transport planning under labour*. In: Docherty, I. and Shaw, J. (Ed.), *A New Deal for Transport?* Blackwell, Oxford
9. Rietveld, P., Stough, R., 2004. Institutions, regulations and sustainable transport: a cross-national perspective. *Transport Reviews*, 24, 2004, pp.707-719
10. Foxon, T. Makuch, Z., Mata, M., Pearson, P. *Towards a sustainable innovation policy – Institutional structures, stakeholder participation and mixed of policy*

- instruments*. 2004. Paper for 'Greening of Policies – Interlinkages and Policy Integration' conference, 3-4 December 2004, Berlin
11. Schofield, J. Time for a revival? Public policy implementation: a review of the literature and an agenda for further research. *International Journal of Management Reviews*, 3, 2001, pp.245-263
 12. Hill, M., Hupe, P. The multi-layer problem in implementation research. *Public Management Review*, 5, 2003, pp.471-490