

EVALUATING TRANSPORT EQUITY IN CAR-DOMINANT CITIES: THE CASE OF DUBLIN, IRELAND.

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Abstract

Researchers define transportation equity as the fairness with which the impacts of transport on society are distributed. These impacts refer to the benefits and costs that arise from transport (Litman, 2012). While transport infrastructure can have important and serious impacts on equity, it is acknowledged by many researchers that these impacts can be difficult to assess and evaluate. However, it is apparent that costs tend to be particularly high in societies with high levels of car-dependency. In addition, certain social and socio-economic groups can be disproportionately burdened by car-dominated infrastructure and policies, for example: the unemployed; lone-parents; the mobility impaired; and children.

This paper presents some of the literature on transportation related equity. The literature review reveals a number of methodologies that have been employed by a variety of researchers from different backgrounds to review the equity of transport. However, the scope of these approaches has generally been limited to impact assessment using a single or small number of variables, or to the evaluation of an individual infrastructure project. As a result, the true nature and extent of transportation inequity at the urban or macro scale has not been assessed.

This paper proposes a broader methodology that brings together many of the relevant variables, but in a new spatially focussed way, using GIS. Impacts and indicators proposed include transport noise; pedestrian severance and casualty risk; accessibility for non-drivers; and socio-economic metrics. This paper provides an overview of the equity of existing transport infrastructure at the urban scale, and can be used to highlight areas that should be targeted for further investigation.

Introduction

Equity is a complex subject and defining what equity means is equally complicated. The subject area has been addressed from a variety of academic disciplines. As a pillar of sustainable development¹, equity should be seen as an important objective of transport planning (Litman, 2012). Banister (2002) notes that a key role for transport planners is to set an agenda for transport based on the concepts of equity. To achieve sustainable transport, Banister (2005) notes that equity, the environment and the economy are the three areas that need to be addressed.

The provision of transport infrastructure can have significant and diverse equity impacts on society through the distribution of costs and benefits (Litman, 2012). Costs tend to be particularly high in societies with high levels of car-dependency and car-oriented land-use and design (Litman, 2012; SDC, 2011). Increasing car ownership, usage and dependency are significant global issues that present key challenges to sustainable development (Banister, 2005). Reducing the need to travel by motorised modes, and promoting more energy efficient modes of travel (for example; walking, cycling and public transport), are key objectives in sustainable development policy, and therefore of relevance to the equity of transport.

This paper addresses transportation related equity and its relevance to the field of transport planning. The paper then proceeds to briefly review how the subject area is addressed in recent literature, and outlines a new methodology for the comprehensive analysis of transport equity in an urban area. The application of the methodology is explored using Dublin as a case study.

Literature Background

Definitions

Although defining equity is not straightforward; for the purposes of this paper, transport related equity has been defined as the fair distribution of transport impacts throughout all sectors of society (Litman, 2012). According to Litman (2012) and Banister (2002), there are two key types of transportation related equity; horizontal equity and vertical equity. Litman (2012) notes that the different types of equity are not clear-cut, and they can conflict as well as overlap.

Horizontal equity is concerned with the equal distribution of impacts, whereby no group or individual is favoured, unless explicitly justified. In this regard, people should be largely treated in the same way in decisions regarding funding and the distribution of benefits and costs. Vertical equity, as defined by Litman (2012), is concerned with the distribution of

¹ Although there is intense debate in the literature about what sustainable development really means, addressing this is outside the scope of this paper. This paper assumes The World Bank's (1996) and Banister's (2006) interpretation of sustainable development (as it particularly relates to transport planning), based on the three basic elements of economic, social and environment development. The World Bank argues that for transport policy to be effective it must support and improve the standard of living (economic and financial sustainability); it must improve the general quality of life (environmental and ecological sustainability); and its benefits must be shared equitably by all sections of the community (social sustainability). Banister argues that economic development relates to the growth of an economy over time and how this is reflected in the wealth of a country. Social development addresses the question of distribution of that wealth between individuals (social equity) and over space (spatial equity). Environment development relates to the protection of the environment and its current stock of resources (intragenerational), and in terms of future stock of resources (intergenerational).

impacts between groups or individuals that are not equal in ability and need, and are 'given special consideration in decision making. This means a particular group might be seen as special or as requiring favourable treatment. Litman (2012) separates vertical equity into two categories: vertical equity with regards to income and social class on the one hand (which Litman states might also be called social justice, environmental justice and social inclusion); and mobility need and ability on the other. With regards to the former, *'transport policies are equitable if they favour economically and socially disadvantaged groups, thereby compensating for overall inequities'*² (p.3). The latter relates to the degree that the transport system meets the needs of travellers with particular constraints, such as the disabled, the elderly or any groups whose mobility is physically impaired in some way.

With vertical equity, there is some debate with regards to 'equity of opportunity' and 'equity of outcome' (Litman, 2012; van Wee and Geurs, 2011). The concept of disadvantaged people having adequate access to education and employment opportunities (equity of opportunity) is usually accepted as an important function of transport; but there is less agreement with equity of outcome (Litman, 2012; van Wee and Geurs, 2011). The latter implies that disadvantaged people, actually succeed in these activities. As Litman (2012) states, transport has an impact upon equity of opportunity, not on equity of outcome as transport has a role in providing a means of accessing activities, like education and employment.

Beyazit (2011) describes two ways that transport plays a key role in ensuring an equitable and just society. Firstly, transport helps distribute the social and economic benefits that are created by, among other things, the means of transport. Secondly, transport supports peoples' capabilities³ by linking them. According to the World Bank (1996), inappropriately designed transport plans can *'aggravate the condition of the poor, harm the environment, ignore the changing needs of users, and exceed the capacity of public finances'* (p. 1). As listed by Litman (2012) in his work on the evaluation of transport equity, examples of equity impacts include:

- The quality of transportation available affects people's opportunities and quality of life, as well as the accessibility and value of land.
- Transport facilities and services impose externalities on others.
- Transport expenditure can represent a significant share of household or business budgets.
- Transport investment can stimulate employment and economic development in certain areas.

Thus, transport planning decisions can have significant and varied equity impacts. These decisions involve making a moral judgement regarding the fairness of the distribution of costs and benefits (van Wee and Geurs, 2011). This gives rise to the need for transport decisions to be evaluated in order to analyse and assess their equity impact. For the purposes of this paper, this process is referred to as 'transport equity analysis' (Litman, 2012).

Transport Equity Analysis

Transportation is the source of multiple social, economic and environmental costs and benefits. Costs and benefits have a reciprocal relationship: a cost can be characterised as a reduction in benefits, and a benefit as a reduction in costs (Litman, 2009). Many of these

² The literature reveals the groups that are most disadvantaged by car-oriented policies and car-dependency. In the UK, for example, the Sustainable Development Commission (2011) published a report which collates much of this literature. This report examines the issue of fairness in transport policy, and addresses the costs associated with high car dependency to the most vulnerable in society, including: children; the elderly; the poor; women; minority ethnic groups and disabled people.

³ Capabilities refers to a *'person's capability to do things he or she has reason to value'* (Sen, 2009, p. 231). If a person's advantage is less than that of another, then he or she is less capable and therefore has less real opportunity to achieve what is valued.

costs and benefits are relevant to transport equity analysis, particularly through their distributional consequences. There has been considerable research undertaken on the economic and environmental impacts of transport (Bristow and Nellthorp, 2000; Lakshmanan, 2011). In contrast, the social and distributional (spatial, temporal and socio-demographic) impacts of transport have received less academic and policy attention, and have been historically underestimated (Markovich and Lucas, 2011; Jones and Lucas, 2012). Jones and Lucas (2012) contend that the social aspects of transportation are very much neglected by academic transportation researchers, and that this is because of "limited recognition and poor articulation" (p.4). Geurs *et al.*, (2009) define the social impacts of transport as 'changes in transport sources that (might) positively or negatively influence the preferences, well-being, behaviour or perception of individuals, groups, social categories and society in general (in the future)' (p. 71). Litman (2012) argues that many of the social variables are seen as intangible and immeasurable, and therefore, tend to be ignored.

The literature reveals a number of ways to analyse the equity of transport, but shows that the scope of these methodologies is often limited to impact assessment using a single or small number of variables, or to the evaluation of an individual infrastructure project. This is compounded by the varying types of equity and impact categories (Litman, 2012), and by the multidisciplinary nature of the subject area. This presents problems for transport equity analysis as there is no single way to evaluate it, and appraisal techniques often focus on a small number of specific indicators rather than comprehensive analysis of all indicators. In practice, Cost-Benefit Analysis (CBA) is the primary method for *ex-ante* transport project evaluation (Beyazit, 2011; Van Wee and Geurs, 2011). CBA has been criticised by a number of authors as being unsuitable for equity or social impact evaluation (Beyazit, 2011; van Wee and Geurs, 2011), particularly as it focuses on aggregate, rather than disaggregate welfare (Thomopoulos *et al.*, 2009; Deakin, 2007).

Studies on the impacts of transport equity have included research on the service quality of public transport, on how transport funding is distributed, and on how transport emissions affect disadvantaged groups (Wu and Hine, 2003; Delbosc and Currie, 2011; Fruin and Srijaj, 2005; Mitchell, 2005; Crouse *et al.*, 2009). These studies have not focussed on multiple indicators of transport (in)equity at the urban or macro level, and therefore a gap in the research exists. In addition, a more comprehensive approach to equity analysis would allow for the potential long term consequences of the incremental impacts of transportation costs to be considered more fully. Litman (2009) argues that neglecting to consider these cumulative impacts is a mistake, as on their own individual costs may not seem to have a significant impact, but when considered together, the combined impact could be more significant. On the other hand, other researchers, such as Fruin and Sriraf (2005), feel that any attempt at more comprehensive equity analysis would be over-complicated and difficult as there are too many resource and time constraints, particularly when examining the macro level.

This research aims to give further consideration to the potential of comprehensive transport equity analysis, using Dublin as a case-study. Dublin represents an interesting case study for a number of reasons that are of interest to the equity debate. Dublin has a post-boom legacy of car-dependant urban sprawl, high unemployment levels, declining income levels, decreasing levels of housing mobility due to negative equity, increasing obesity and public health concerns; and a birth rate⁴ that is high by European standards. The following section discusses the methodology that is proposed. The research is largely focussed on vertical equity, as a key area of concern is the fairness of sustainable transport service provision and infrastructure design, particularly for disadvantaged groups.

⁴ The latest figures (from 2009) published by the Central Statistics Office (2012) in Ireland, show that Ireland continues to have the highest fertility rate in the 27 EU member states at a rate of 2.1 children per woman. This is of concern to the equity debate, for example, as children are one of the groups identified as being most vulnerable to the impacts of car-dominated design and policies (SDC, 2011).

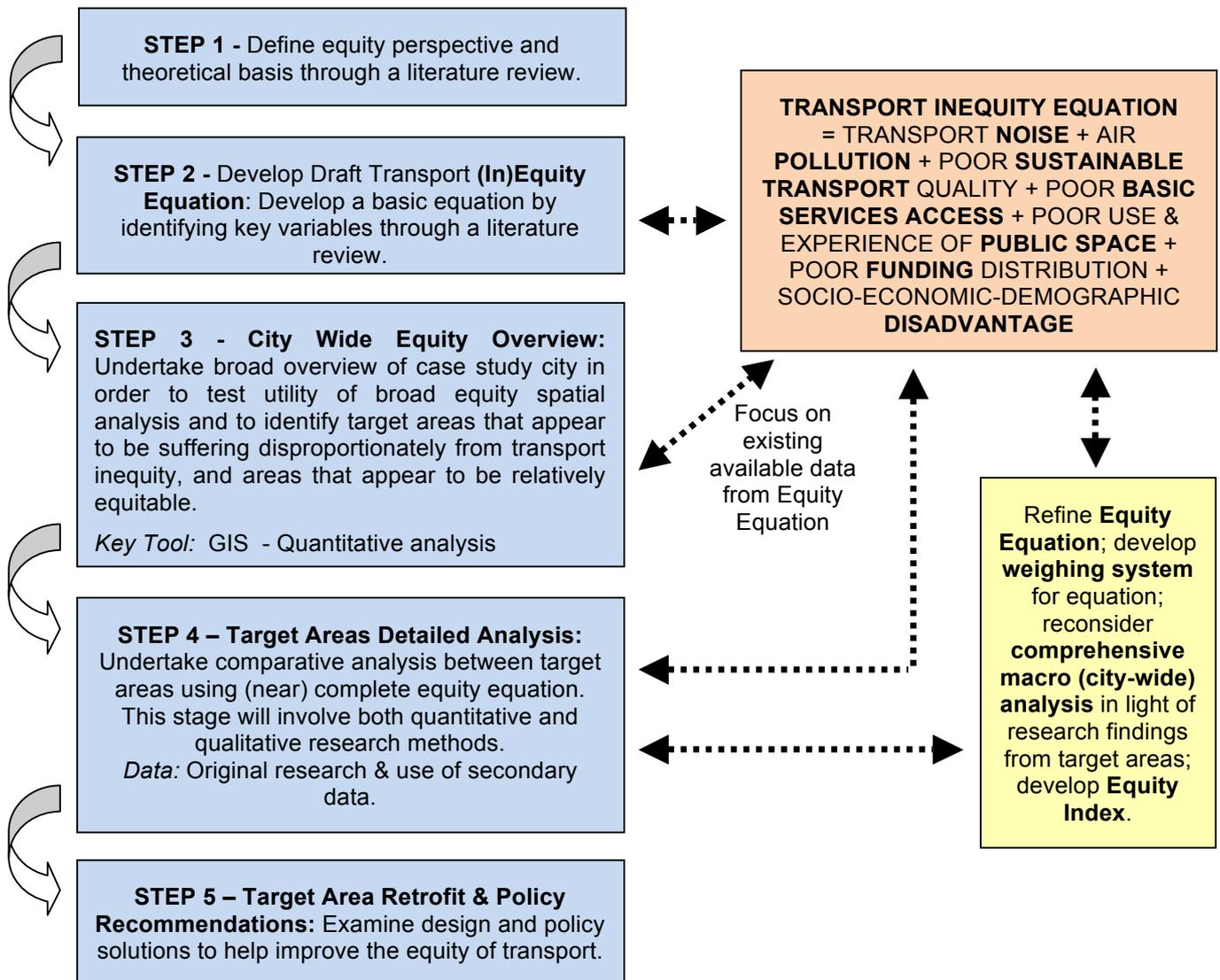
Research Methods

The research methods outlined below represent the early stages of the research project.

Key Research Aims:

- To test a practical methodology for both comprehensive transport equity analysis and a broad spatial overview of same.
- To strengthen the research knowledge base in the area of social transport impacts.

Figure 1: Draft Research Steps



Conclusion

Equity is an important part of sustainable development, and is a significant objective of transport planning (Banister, 2002; Litman, 2012). It is a particular issue in cities with high levels of car-dependency, and socio-economic and socio-demographic disadvantage (Litman, 2012; SDC, 2011). The literature reveals a lack of comprehensiveness in studies addressing transportation equity. Although there is an expansive list of the costs and benefits of transport, the fairness of the spatial, temporal and socio-demographic distribution of these impacts is not addressed in a comprehensive manner (Markovich and Lucas, 2011; Jones and Lucas, 2012). Social impacts have not been as well researched as economic and environmental impacts (Jones and Lucas, 2012). In addition, those studies that do address equity tend to focus on a small number of variables. This research aims to address this by suggesting and testing a more comprehensive and multi-variable approach to transport equity analysis, and to target social impacts for more detailed research as part of this process. Obtaining suitable multi-variable related data is a key issue for the success of this project, and for its ability to be replicated in other urban areas for comparison.

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