



Towards a more equitable distribution of resources: Using activity-based models and subjective well-being measures in transport project evaluation



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ABSTRACT

In this paper, we develop an innovative and comprehensive transport evaluation criterion to better account for equity considerations in transport project evaluation. This work explores transportation benefits from the consumer's perspective to accessibility as a key benefit generated by any transportation project. To assess the full benefits of transportation project implementation for various consumers and calculate the improvement in accessibility, it is best to use Activity-Based Models (ABM). ABMs have two important advantages for equity analysis, which have not been utilized in the literature so far: first, ability to analyze results by various groups of the population; second, these models can utilize the Activity Based Accessibility (ABA) measure to estimate the overall benefits from transport investments and policies. The ABA measure allows one person to have different accessibilities for different choice situations, depending on his/her characteristics. We suggest including social and spatial factors in social welfare assessment by introducing the concept of accessibility gains to key social activities. Specifically, it is suggested to incorporate subjective well-being consideration into a new evaluation framework "Equity Benefit Analysis" (EBA). we use an alternative measure, "Subjective Value of Accessibility gains" (SVOA), which is based on the ABM accessibility measure as well as on Subjective Well-Being (SWB) measure, as the key benefit taken into account in the evaluation process. The SVOA is not intended to replace the current practice of analyzing equity by comparing various impacts on different groups of the population, but can aid by providing policymakers with a single measure advancing both equity and efficiency considerations and facilitating comparison among alternatives. Initial case study results indicate the SVOA can show higher benefits to policies focusing on the needs of vulnerable social groups that compared traditional measures.

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1. Introduction

Transportation infrastructure has a massive impact on economic growth and society; it is an important component in the development and growth of a country, and, consequently, the investments in transportation systems are enormous. Two major considerations should guide the evaluation of transport projects: efficiency, a measure of the degree to which system

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outputs achieve a theoretical maximum (minimum) using the same level of inputs, and equity, a measure of the distribution of outputs (or inputs) across the population (Levinson, 2010). However, the most commonly used tool for policy analysis in the transport field is Cost Benefit Analysis (CBA), leading to a focus on efficiency aspects rather than on equity (Rietveld, 2003). Indeed, our review of various transport project appraisals guidelines (see Section 2.2) shows that in the vast majority of cases disparities in society are not taken into account. The key role ascribed to equity in political debates is not reflected in ex ante policy studies in transport.

Equity aspects should be included in a more explicit manner in the evaluation recognizing that in a complex system, like transportation, if the most equitable investment will be made, that is to say, were it is most needed; then, it will produce the most efficient outcomes. However, the integration of equity in economic evaluation involves great complexity, and therefore it is usually neglected despite its great importance (Rietveld, 2003). Complexity is due to several factors: first, there are multiple types of equity; second, there are various ways to categorize people for equity analysis (according to socio-economic status, income level, education, etc.); finally, there are numerous impacts to consider, and various ways of measuring these impacts (Litman, 2002; Nahmias-Biran et al., 2013a).

We explore transportation benefits from the consumer's perspective and suggests a simple framework for the inclusion of social factors in the assessment of transportation projects towards a more equitable distribution of resources. We present a framework of a new measure, the "Subjective Value of Accessibility gains" (SVOA), which takes into account both efficiency and equity considerations, based upon both Cost-Benefit Analysis and Multi-Criteria Analysis. The suggested measure is not intended to replace the current practice of analyzing equity, yet it can provide policymakers with a new measure that promotes both equity and efficiency considerations in comparing among alternatives, shifting the focus in the overall evaluation to the underprivileged sectors of society. The designed measure can take into account the heterogeneity in passenger preferences and their basic level of accessibility, and compensate for the existing bias of traditional evaluation tools in a structured way.

This paper contains four main parts. In Section 2, we present the theoretical background, providing an overview of the three main fields from which this work stems: ethical framework, transportation project evaluation, and transport modeling. Section 3, on the methodology, presents the new framework and its mathematical elaboration. Section 4 includes a case study and a preliminary examination of the new framework. Finally, Section 5 presents the main conclusions and findings of this work.

2. Theoretical background

The following sections comprise a literature review of the key topics of this work: equity considerations, transport project evaluation, and travel demand modeling.

2.1. Ethical frameworks

Justice theories have an expression in practice; any economic evaluation scheme reflects a theory which is the moral justification for the distribution of resources in one way or another. Therefore, a discussion of these theories is essential to the integration of equity considerations into economic evaluation. This topic justifies a complete discussion of its own; see for example Nahmias-Biran et al., 2013b; Martens, 2006; and Van Wee and Geurs, 2011. Yet, the moral justification constitutes a main motivation of this work; therefore, we briefly present theories which are relevant to the methodology presented in this paper.

During the 20th century, the utilitarian approach has prevailed, as it reflects the backbone of welfare economics and CBA (Thomopoulos et al., 2009). According to the utilitarian approach, a society is properly arranged when its institutions maximize the net balance of satisfaction. Utilitarianism has drawn considerable criticism (Rawls, 1986, p. 651), while it does distinct between persons by their willingness to pay, but raises equity issues as discussed in Section 2.2.2

On 1971 Rawls has founded a new intellectual approach that focuses on the basic structure of society. Rawls argued that a just structure implies a distribution of primary social goods according to a well-defined set of principles. He suggested considering the needs of individuals – as opposed to “maximizing the welfare” – the interpretation of society's needs as a whole. Rawls also claimed that we should not favor the majority at the expense of the least well off, and that “Inequalities are permissible when they maximize, or at least all contribute to, the long term expectations of the least fortunate group in society” (Rawls, 1971, p. 60–90).

The greatest strength of the 'Primary Social Goods' approach is that it asserts that there are absolute values - things that matter to all human beings - overcoming the relativism of economics and related preference-based accounts (Dodds, 1997). Rawls suggested that a relatively uncontroversial account of rationality could help us work out the features of the index of these primary goods. Some researchers have suggested that accessibility, a measure of an individual's ability to participate in activities in the environment, could be interpreted as an additional primary good (Martens, 2006; Van Wee and Geurs, 2011). In accordance, Martens (2006) suggested basing economic evaluations on an accessibility measure. In this work, we carry out this theoretical idea and bring it into action. In line with Rawls' approach, we suggest basing transport economic evaluation on both objective and subjective measures.

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