



Integrating equity in transportation project assessment: a philosophical exploration and its practical implications

Bat-hen Nahmias-Biran, Karel Martens & Yoram Shiftan

To cite this article: Bat-hen Nahmias-Biran, Karel Martens & Yoram Shiftan (2017) Integrating equity in transportation project assessment: a philosophical exploration and its practical implications, *Transport Reviews*, 37:2, 192-210, DOI: [10.1080/01441647.2017.1276604](https://doi.org/10.1080/01441647.2017.1276604)

To link to this article: <https://doi.org/10.1080/01441647.2017.1276604>



Published online: 15 Feb 2017.



Submit your article to this journal [↗](#)



Article views: 203



View related articles [↗](#)



View Crossmark data [↗](#)



Citing articles: 1 View citing articles [↗](#)

Integrating equity in transportation project assessment: a philosophical exploration and its practical implications

Bat-hen Nahmias-Biran^{a,b}, Karel Martens^{b,c,d} and Yoram Shiftan^b

^aFuture Urban Mobility Group, Singapore-MIT Alliance for Research and Technology (SMART), Singapore, Singapore; ^bFaculty of Civil and Environmental Engineering, Technion – Israel Institute of Technology, Haifa, Israel; ^cFaculty of Architecture and Town Planning, Technion – Israel Institute of Technology, Haifa, Israel; ^dInstitute for Management Research, Radboud University, Nijmegen, The Netherlands

ABSTRACT

This paper provides an overview of the conceptual essence of a number of justice theories and their possible consequences for transport project appraisal. In this paper, we discuss three alternative philosophical approaches to the still-dominant approach of utilitarianism: Rawls's approach, Walzer's approach, and the capability approach (CA), as they have different practical implications. We discuss which of these approaches could potentially give guidance to transportation appraisal, and which approaches are not suited for this purpose. We demonstrate the use of the CA and compare it to utilitarianism in a case study, and discuss the implications of adopting the former for transport evaluation and policy.

ARTICLE HISTORY

Received 7 February 2015
Accepted 24 November 2015

KEYWORDS

Evaluation; accessibility;
Rawls; justice; Walzer;
capability

1. Introduction

Behind every method for (economic) evaluation of government interventions is an, often implicit, justice theory, which provides the moral justification for the implicit distributive considerations that underpin the evaluation approach. Therefore, the integration of equity considerations in economic evaluation requires an understanding of the underlying theories as well as their possible alternatives. The aim of this paper is to explore the key principles of three influential theories of justice, to investigate the implications of one particularly promising theory for project appraisal (the capability approach (CA)), and compare this approach with the utilitarian approach currently underlying cost-benefit analysis (CBA).

We limit ourselves to three theories that have attracted substantial attention in the transport literature: Rawls' theory of justice (see e.g. Khisty, 1996; Lucy, 1981; Raux & Souche, 2004; Taylor & Norton, 2009; Van Wee, 2012); Walzer's Spheres of Justice (Martens, 2012, 2017; Martens & Golub, 2012); and the CA (e.g. Beyazit, 2011; Eitoku & Mizokami, 2010; Inoi & Nitta, 2005; Martens & Golub, 2012; Nitta, Inoi, & Nakamura, 2004; Ryan, Wretstrand, & Schmidt, 2015; Smith, Hirsch, & Davis, 2012; Tyler, 2006; Van Wee, 2011; Wismadi, Zuidgeest, Brussel, & van Maarseveen, 2014). These theories

CONTACT Bat-hen Nahmias-Biran ✉ bathen@smart.mit.edu Future Urban Mobility Group, Singapore-MIT Alliance for Research and Technology (SMART), 1 CREATE Way, #10-01 CREATE Tower, Singapore 138602, Singapore

© 2017 Informa UK Limited, trading as Taylor & Francis Group

have been influential in (academic) debates over justice; they also have quite distinct practical implications. We also explore applications of these philosophies of justice in specific domains, such as healthcare and education, in order to draw parallels with justice in the domain of transportation.

Project appraisal, whether it takes the form of a CBA or not, usually covers a range of impacts of transportation projects, including travel time savings, environmental impacts, and safety impacts. In what follows, we focus on accessibility as a key benefit generated by any transportation project. Accessibility benefits encompass the possibilities transportation infrastructures and services offer to travel to places and to access people and opportunities (Black & Conroy, 1977; Hansen, 1959). Accessibility indicates ability, that is, the ability to accomplish a broad range of actions, by linking to places and people that are set apart in space and time; it is therefore a strategic dimension in the evaluation of the consumer benefit from any transportation project (Geurs, Zondag, de Jong, & de Bok, 2010; Macário, Filipe, Martins, & Reis, 2007). The importance of studying accessibility is underlined by the fact that accessibility captures the relationship between transportation infrastructures, activities, and land uses (Dong, Ben-Akiva, Bowman, & Walker, 2006; Levinson, 2003). Accessibility has both a use value and an option value (Laird, Geurs, & Nash, 2009). Having accessibility to a wide number of jobs, shops, medical services, or educational facilities is a value in itself, even if no actual use is made of these destinations, as it increases choice and thus future options (Lucas, 2012; Martens, 2017; Wee & Geurs, 2011).

Clearly, social justice encompasses a range of concerns, including concerns about due process and participation in decision-making. We focus on the distributive dimension of social justice, which is a key part of any conceptualisation of justice (Miller, 1999). Distributive justice is about “the morally proper distribution of goods and bads over members of society” (Boucher & Kelly, 1998). The notion of distribution may create some confusion in relation to accessibility. We do not mean to say that accessibility is distributed over people in the same way as candies are distributed among a group of children. The accessibility levels experienced by people are not only a result of a myriad of decisions, including residential choice of households, location choices of businesses and services, and decisions about the transportation system, but are also based on individuals’ characteristics and abilities. Yet, governments can directly and indirectly give direction to these decisions, thereby shaping accessibility patterns and thus the resulting distribution of accessibility.

The paper consists of five sections. Following this introduction, we briefly review in Section 2 theories of justice which could present an alternative to the dominant utilitarian approach currently underpinning policy-making in the transportation sector. In Section 3, we discuss in detail the two approaches from which explicit principles and guidelines can be extracted for transport appraisal: the traditional utilitarian approach and the CA. Then, in Section 4, we demonstrate through a simple case study how these selected theories and related principles can be expressed in a practical evaluation of transportation projects. Finally, in Section 5, we conclude and discuss the implications of these theories for project assessment.

2. Theories of justice

It is no secret that transportation planning is currently based on the philosophy of utilitarianism (see Martens, 2012; Nahmias–Biran, 2016; Van Wee, 2011; as well as Pereira,

Schwanen, & Banister, 2017). At least since Rawls' publication of *A theory of justice*, the utilitarian approach has been criticised on an increasing number of grounds (Rawls, 1971). This criticism has also filtered into the domain of transportation (Nahmias-Biran & Shiftan, 2016; Rietveld, 2003), challenging the approach to transportation planning that is based on the utilitarian philosophy. Against this background, the purpose of the exploration in this section is to critically explore the possible relevance of some alternative philosophical approaches to utilitarianism. Based on this exploration, we identify what seems to be the most promising alternative theory.

2.1. Rawlsian approach

Rawls' theory of justice has been summarised eloquently in the paper by Pereira et al. (2017). We will therefore not repeat the main lines of the theory here. Instead, we will critically reflect on the possibilities to extend Rawls' theory to the domain of transportation. For this purpose, we will review the attempts to include health and healthcare within Rawls' framework. We will then return to the proposal by Pereira et al. (2017) to merge Rawls' theory in an overarching framework regarding equity in accessibility.

2.1.1. Extending Rawls' theory

As also underscored by Pereira et al. (2017), Rawls explicitly states that his theory relates to the basic structure of society. The three principles he defines and distinguishes are not intended to guide the distribution of any other good than the clearly defined set of primary goods. Yet, Rawls and others have explored the implications of *Justice as Fairness* for other domains of society, notably for the domain of health. Here, we briefly discuss these "extensions" of the theory in order to determine possible implications of Rawls' theory for the domain of transportation, drawing in part on Martens' recent work (Martens, 2017).

In part in response to criticism, Rawls has sought to expand his theory in his later work to include healthcare (Rawls, [2001] 2003). He proposes that persons who suffer from ill health are to receive healthcare financed through taxation of the better off. He proposes that this redistributive policy – a reduction in income for better-off groups to the benefit of health services for the least-advantaged groups – can continue "up to the point where further provision would lower the expectation of the least advantaged" (Rawls, [2001] 2003, p. 173). The thinking here is similar to that underlying the difference principle *per se*, but now the expectations of the least advantaged include not only income and wealth, but also "the provision of health care at a certain level (calculated by estimated cost)" (Rawls, [2001] 2003, p. 173). The idea is that taking income and wealth from better-off groups may not only lower the income of these richer groups directly, but may also reduce the total wealth in a society as incentives for hard work are lessened. Thus, by taking some income from the best-off groups and using it for healthcare, the least advantaged gain in healthcare but may lose in income and wealth because of a reduction in the overall wealth in society. The understanding of this dynamic and its detrimental impact on the least-advantaged groups creates an intuitive "cap" on the use of society's resources for health services.

Other authors have also sought to expand Rawls' theory to the domain of health and healthcare (e.g. Andersson & Lyttkens, 1999; Bommier & Stecklov, 2002; Denier, 2007;

Green, 1976). The most prominent author who has taken up this challenge is Daniels (1985, 2008), who has done so by broadening Rawls's notion of opportunity to offices and positions. Daniels (2008) defines opportunity as "the array of life plans persons can reasonably choose" (p. 59). Daniels argues that, given the often pervasive impact of poor health on the size and scope of a person's opportunity range, institutions meeting health needs should be governed by the goal to restore health *in order to guarantee* fair equality of opportunity in its broadest sense. Daniels broadens the notion of opportunity in order to include healthcare institutions among the basic institutions of society. The functioning of these institutions should be guided by Rawls' principle of fair equality of opportunity: "if justice requires protecting opportunity then it requires protecting health" (Daniels, 2008, p. 46).

The approach taken by, respectively, Rawls and Daniels to incorporate healthcare in Rawls' theory runs into the same, classical, problem of interpersonal comparison. This problem has been intensively debated in economics (e.g. Harsanyi, 1955; Kaldor, 1939; Scanlon, 1991). Interpersonal comparisons "have been thought to involve value judgments of a kind that are not only out of place in positive economic science but also inappropriate as a basis for decisions of social policy" (Scanlon, 1991, p. 17) and, hence, for claims of justice. The problem lies in the fact that people may differ in the relative value they attach to different goods. Hence, if a set of different goods is used as an indicator of fairness, it becomes impossible to compare the relative position of two different persons without making (paternalistic) value judgements regarding the relative importance of the different goods that make up the set. Neither Rawls nor Daniels can avoid interpersonal comparisons. Even if only the situation of the least-advantaged group is taken into consideration, expansions in healthcare will have to be weighed against improvements in income and wealth. It was precisely this process of weighing one moral intuition against another that Rawls sought to avoid in his theory of justice. By expanding his theory to the domain of health, weighing returns in full force. Daniels explicitly acknowledges this and concludes that the only way of determining the boundaries of public spending on healthcare is through a fair, deliberative process of decision-making.

The same problem of interpersonal comparison will emerge if Rawls' theory is expanded to include accessibility. In that case, it is virtually inevitable that improvements in accessibility have to be weighed against increases in income and wealth. We thus follow the conclusion of Daniels and conclude that Rawls' theory does not provide sufficiently clear directions for the distribution of transportation benefits, without having to revert to a procedural approach to fairness.

This conclusion does not imply that Rawls' theory of justice cannot serve as a source of inspiration for the debate about equity in transportation. It merely implies that the theory cannot provide a solid footing for a particular distribution of accessibility. Pereira et al. (2017) basically use Rawls' theory in an eclectic way, collecting suitable "ingredients" for an overarching approach to equity in accessibility. While we tend to agree with them that "a transport policy is fair if it distributes transport investments and services in a particular way that reduces inequality of opportunity" and that "policies should prioritize disadvantaged groups", these statements cannot be justified by merely referring to Rawls's powerful theory of justice. These statements require a more solid footing in philosophical reasoning.

2.2. Walzer's approach

The relevance of Walzer's approach to justice for the transportation domain has been explored by Martens and co-authors (Martens, 2012, 2017; Martens & Golub, 2012). According to Walzer's approach, a society is just if and only if its practices and institutions of exchanging and sharing goods are in accord with the shared values and cultural understandings of its people.

Walzer views society as a distributive community in which people produce a wide variety of goods that are subsequently shared, divided, and exchanged in specific ways. Goods are, by definition, social goods: their meaning is socially constructed. Walzer (1983), therefore, argues that "[a]ll distributions are just or unjust relative to the social meanings of the goods at stake" (p. 9).

Walzer subsequently argues that goods with a distinct social meaning should be set apart from other goods. A good has a "distinct" character if its social meaning differentiates it from regular commodities that are exchanged in the market place. The distribution of such goods should not be subject to market forces: "When meanings are distinct, distributions must be autonomous" (Walzer, 1983, p. 10). In order to achieve this, goods with a distinct meaning should be set aside in a so-called distributive sphere. Such a sphere, in turn, is characterised by two basic features.

First, the distribution of a good in a distributive sphere should be guided by *internal reasons* only, that is, be derived from the *social meaning* a particular society ascribes to a good (Trappenburg, 2000). Walzer thus eschews any universal standpoint, as Teuber (1984) rightfully observes. He concedes that there is no clear-cut procedure for determining the shared understandings and shared commitments regarding a particular good (Walzer, 1983, p. 10). Yet, he argues that shared social meanings can be derived by studying what a good means in a particular society, what importance is attached to a good, and so forth. Once the social meaning is identified, it is possible to determine which principle would be appropriate for the distribution of the good. Walzer's theory thus implies a multiplicity of distributive principles across a wide range of spheres. Walzer argues, among others, that justice in the sphere of primary education has to do with creating equal opportunities; that justice in the sphere of welfare requires that goods are distributed according to "socially recognised needs"; and that justice in the sphere of politics is about procedures such as democratic elections, the will of the majority, and gaining the public's favour (Trappenburg, 2000, p. 344).

Second, a distributive sphere should be *autonomous* from the distribution of goods in other spheres. According to Walzer, injustice occurs if spheres are not autonomous. In that case, the distribution of one good or one set of goods can become dominant and determine the distributions in all, or many, spheres of distribution. Money and power are the typical examples and are, what Walzer calls, "dominant goods" (Martens, 2012; Teuber, 1984). The power of a "dominant good" should be reined in by setting borders around the spheres in which socially distinct goods are being distributed. In "formal terms", Walzer (1983) writes, these (institutional) borders are to guarantee "that no citizen's standing in one sphere or with regard to one social good can be undercut by his standing in some other sphere, with regard to some other good" (p. 19). What emerges is a state of what Walzer terms "complex equality": a situation in which inequalities *within* spheres

may exist, but in which the autonomy of distributive spheres will guarantee that inequalities will not necessarily sum up *across* different goods or spheres.

Walzer's theory is particularly relevant to support the claim that accessibility is the key social good being distributed in the domain of transportation. This point has been made by Martens (2012) and Martens, Golub, and Robinson (2012). Following Walzer, these authors argue that the distributive question does not relate to the wide range of transport-related goods and bads, such as highways, road taxes, public transport lines, bus stops, public transport fares, bicycle lanes, gasoline, and so on. The social relevance of each of these goods and bads lies first and foremost in their contribution to the overarching good of accessibility. It is accessibility which shapes people's life opportunities. Given the importance that people attach to opportunities in today's (Western) societies, and the important role of transportation in realising these opportunities, a distinct distributive approach to transport benefits can be justified. It is thus the good of accessibility that has a distinct social meaning and that deserves to be set apart in a separate sphere.

If the argument is accepted that accessibility is a social good with a distinct social meaning, then this has direct distributive implications. This is so because goods with a distinct social meaning "deserve" a separate sphere, in Walzer's theory. The creation of an autonomous sphere is necessary to disentangle the distribution of accessibility from the way other (dominant) goods in a society are distributed. Or, phrased the other way around, without a separate sphere, the distribution of accessibility will be dominated especially by the distribution of money or income over members of society. Thus, Walzer's approach provides a solid basis for a philosophical critique of current approaches to transportation planning, in which the principle of demand typically plays a pivotal role (as evidenced in the use of travel demand models). After all, the principle of demand merges the concepts of ability-to-pay and willingness-to-pay into one. By giving this principle centre stage in travel modelling, it is likely that proposed transportation solutions result in a distributive pattern that reflects the distribution of income over society. In other words, currently the transportation sphere lacks the "good fences that make just societies" (Walzer, 1983, p. 319).

This is an important insight. But beyond providing a solid footing for this fundamental critique, Walzer's theory does not provide any demarcation points for delineating which justice principle should guide the distribution of accessibility.

This is so because Walzer upholds that the distribution of a good should be guided by internal reasons only, that is, be derived from the social meaning a particular society ascribes to a good. In Walzer's perspective, the search for the appropriate principle for the distribution of accessibility is thus conflated with the search for the social meaning of the notion of accessibility. It is this conflation in Walzer's theory that has been heavily criticised, for two reasons (see e.g. Dworkin, 1983; Teuber, 1984). First, it implies that the distributive principles have to be "read" by studying society, without the need to provide a moral, yet well-reasoned, justification for the identified principles. Second, and related, it also poses the risk that so-identified principles reflect the interests of the dominant groups in society, rather than broadly shared meanings (Teuber, 1984). While Walzer acknowledges these inherent challenges, he underscores that the shared understandings of a particular good are always open to interpretation and are always open for debate. As Teuber (1984) rightfully concludes, Walzer does not provide a way for solving deep disagreements over the meaning of a social good. Indeed, in Walzer's

perspective there is no universal standpoint, no “Archimedean point”, from which to judge the appropriateness of any social meaning ascribed to a good (Dworkin, 1983). In Walzer’s perspective, every substantive account of distributive justice is a local account. For this reason, we feel that Walzer’s theory fails to provide clear and solid demarcation points for the distribution of accessibility.

2.3. The CA

Sen has developed an approach to social justice rejecting the welfarist approach underlying utilitarianism and the resource approach underlying, among others, Rawls’ theory of justice. He has developed a notion that lies, as it were, between resources and welfare: capabilities. Sen describes capability as “our ability to achieve various combinations of functionings that we can compare and judge against each other in terms of what we have reason to value” (Sen in Beyazit, 2011, p. 233). Functionings are states of being and doing, that is, activities that a person can undertake. A capability set represents a person’s opportunities to achieve functionings (Dagsvik, 2013). Sen’s key point is that people differ fundamentally in their ability to translate resources into functionings and capabilities. He argues that questions of distribution should focus on functionings and capabilities, rather than on resources such as primary goods, as upheld by Rawls. Like Rawls, Sen also argues against taking welfare, or utility, as the primary “space” within which people should be compared among each other (Sen, 1980, p. 366). Welfare, Sen argues, is inappropriate as the focal variable for comparison, because it relates only to what people actually do, rather than to what people could do. What is important is the range of beings and doings that people have reason to value; this range is the core of the notion of freedom (Cohen, 1993). In other words, having the opportunity to choose from various alternatives is a value in itself, even if no actual use is made of these opportunities, as it increases choice and thus future options. Focusing on welfare would ignore the pervasive importance of the notion of freedom. Freedom, in turn, is essential, as it is a prerequisite for a person to execute his or her agency, that is, to be able to give direction to his or her own life (Sen, 2011).

Sen (1999) perceives freedom as a combination of both “processes that allow freedom of actions and decisions, and the actual opportunities that people have, given their personal and social circumstances” (p. 17). In the CA literature, freedom is seen as a way to reach actions and decisions.

Nussbaum has further developed the CA. She construes the notion of “basic capability”, which encompasses the set of capabilities needed for a minimally decent life (Nussbaum, 2000). She distinguishes 10 basic capabilities: (1) being able to live to the end of a human life of normal length; (2) being able to have good health; (3) being able to move freely from place to place; (4) being able to use the senses, to imagine, think, and reason; (5) being able to have attachments to things and people outside ourselves; (6) being able to form a conception of the good and to engage in critical reflection about the planning of one’s life; (7) being able to live with and towards others, and having the social bases of self-respect and non-humiliation; (8) being able to live with concern for and in relation to animals, plants, and the world of nature; (9) being able to laugh, to play, to enjoy recreational activities, and to control one’s environment; and (10) being able to participate effectively in political choices that govern one’s life and being able to hold property.

Following Nussbaum's suggestion to produce a list of functionings, the next challenge is to define a threshold level for each of these basic capabilities. Clearly, this is a major challenge. Sen leaves this question open and vaguely indicates that this level is to be decided by decision-makers and the wider public (Sen, 1985). Above the threshold level for each capability, differences in the level of capability that people can attain do not signify an injustice – they do not change the fact that everyone does or does not enjoy equal basic capabilities. To obtain equal basic capability for everyone implies moving each and every person towards and beyond the threshold level for each of the capabilities that are specified to be necessary for a minimally decent or good enough life. So understood, the basic capability proposal falls in the family of sufficientarian ideals (Arneson, 2002).

As transportation is the means to reach those activities that shape a person's capabilities, and accessibility is a prerequisite to realise (at least some of) the related functionings, which depend not merely on resources, but rather on the interaction between resources and personal characteristics, then fairness requires a particular measurement of accessibility (Martens & Golub, 2012). It should reflect the relevant personal characteristics that shape a person's possibilities to translate a resource ("objective" accessibility) into a capability ("experienced" accessibility). This was explored by Smith et al. (2012) in terms of public transport resources, and by Ryan et al. (2015) for rural households, compared with their urban counterparts.

The CA thus provides two important insights for the distribution of accessibility. First, accessibility should be distributed in such a way as to guarantee persons a sufficient level of capabilities (many of which, but not all, can be linked to actual, physical, destinations). This implies a notion of minimum thresholds regarding accessibility. Second, the approach suggests that accessibility should be measured in a specific way, taking into account the particularities of the person as much as the characteristics of the transport and land-use system (see Nahmias–Biran, 2016).

2.4. Conclusion

Based on our discussion above, we come to the following main findings and conclusions regarding each of the justice approaches discussed above:

- Rawls' theory of justice deals with the basic structure of society; therefore, it would be a mistake to simply adopt one of Rawls' principles of justice to the domain of transportation, as has been done in the transportation literature (for instance by Khisty, 1996). Daniels' approach, which made a connection between normal functioning and the opportunity range in order to extend Rawls' theory to the domain of health, provides a more promising route for applying the theory to transportation. At the same time, this approach ultimately runs into the problem of interpersonal comparison, which can only be solved by reverting to a procedural approach to justice. Following Daniels' and Rawls' path of extension for the domain of transportation would inevitably also result in a procedural solution to the distributive question. Hence, we conclude that Rawls' theory of justice does not provide an adequate basis for identifying an appropriate justice principle for the distribution of accessibility.

- Walzer's approach to justice is strongly based on the shared values and cultural understandings of people in a particular community. His theory is particularly suited to establish a justification for a distributive approach to accessibility: given the importance that people attach to opportunities in today's society, and the important role of transportation in realising these opportunities, a distinct distributive approach to transport benefits can be justified. But the theory is of limited value in the effort to establish a justice principle for the distribution of accessibility. This is so because Walzer upholds that every substantive account of distributive justice is a local account; justice principles for the distribution of a particular good can only be established based on an interpretation of the social meaning ascribed to that good in a particular society.
- The CA emphasises the actual opportunities that people have, given their personal and social circumstances. While the approach does not explicitly relate to transportation, it is understood that transportation is the means to realise at least part of a person's capabilities. The emphasis on sufficient capabilities provides some rough compass for the distribution of accessibility: a transport system should not create a barrier for persons to achieve a sufficient level of capabilities. A problem of this doctrine is that it may not be possible non-arbitrarily to specify a line of sufficiency. Yet, this problem is of a different order from the one posed by Rawls' theory of justice. Where the latter does not provide a solid ground for determining *which* justice principle to employ in the domain of transportation, the CA *does* point at a particular principle: the sufficiency principle. By doing so, the CA thus provides clear demarcation points for the evaluation of transport projects, even though the setting of a sufficiency threshold remains a clear challenge for this approach.

We therefore conclude that only the CA provides a promising alternative to the dominant utilitarian approach in transportation. The CA, in particular the version developed by Nussbaum, suggests a sufficiency standard for accessibility as a prerequisite for guaranteeing a sufficient level of basic capabilities. In the following paragraph, we will demonstrate the practical implications of utilitarianism and the CA for project appraisal.

3. Project appraisal based on utilitarianism and the CA

The utilitarian roots of transportation planning are clearly evident in transport project appraisal and in particular in the use of CBA. CBA has become the accepted standard for evaluating transport projects since the early 1960s (Odgaard, Kelly, & Laird, 2005). In CBA, the general notion of "utilities" is, first, operationalised as encompassing distinct benefits and costs such as reductions in travel time, reductions in motoring costs, number of seriously injured, construction, and maintenance costs. Subsequently, each benefit and each cost is ascribed a monetary value, so that the contribution of a project to the overall welfare of a society can be quantified. Following the utilitarian approach, transportation projects or policies are evaluated and selected based on the total amount of (net) benefit a project brings to the entire population.

CBA has been criticised for a range of reasons. A key critique relates to the lack of explicit consideration for the distribution of benefits (and costs) in the utilitarian approach (Tavasszy, Jonkhoff, Burgess, Rustenburg, & Hunt, 2005; Martens, 2011; Quinet, 2000). This is deemed to be especially problematic in the case of transport infrastructure

investments, as the distribution of benefits and costs over population groups tends to be systematic in character (Martens, 2006). That is, projects that generate benefits for already well-off groups, whether in terms of income or accessibility, tend to fare better in CBA than projects that primarily serve disadvantaged groups. While some of the equity concerns have been addressed, most notably through the widespread use of so-called equity values of time, the character of CBA has not fundamentally changed in response to the critique (Mackie et al., 2003). Indeed, the fundamental critique on the utilitarian approach underlying CBA has never been satisfactorily addressed. The critical voices have become more vocal over the past years (Nahmias-Biran & Shiftan, 2016), pointing to the need for an alternative approach to address equity concerns in project appraisal.

The CA suggests a radically different approach to transport project appraisal. Following the CA, it becomes essential to estimate a person's ability to reach essential activities. The ability to reach activities can be perceived as the transportation component of a person's capability. The actual travel towards a selected activity can be seen as a person's functioning in the transportation domain. Capability is thus captured by the notion of accessibility, that is, the ease with which pieces of land and their associated activities can be reached; functioning is captured by the notion of mobility, the actual level of movement on the transportation system. Since the CA underscores the importance of freedom, or the "range of states" a person can achieve, the appraisal of transportation investments should not focus on the actual levels of mobility enabled by these investments, but on the accessibility conferred to persons by these projects, irrespective of the actual use of the transportation system by persons. The "logsum", developed in an entirely different context by Ben-Akiva and Bowman (1998), can be seen as capturing, in an elegant way, the range of states a person can obtain. The "logsum" is the log of the denominator of a logit choice probability, which gives the expected utility from a choice among a range of alternatives. The logsum is a measure of accessibility, in which different persons can have different levels of accessibility for identical choice situations, depending on persons' characteristics and particular situations (Nahmias-Biran, 2016). Therefore, it is considered an appropriate measure to determine a person's level of capability.

The CA, certainly as developed by Nussbaum (2000), also necessitates the determination of a minimum level of accessibility. Below such a minimum level, a person lacks sufficient accessibility to engage in the activities deemed normal in society. The determination of this minimal level is not a simple task and will certainly require a deeper understanding of the relationship between basic capabilities and travel and between accessibility and activity participation (Martens, 2017; Martens, Di Ciommo, & Papanikolaus, 2014), topics that have received surprisingly little attention in the literature (but see some recent work: Adeel, Yeh, & Zhang, 2016; Hu & Giuliano, 2014; Weis, 2012; Weis & Axhausen, 2012). The determination of the sufficiency level is beyond the scope of this paper. For our purpose, it is important to underscore that the CA suggests that the appraisal of transport investments or policies should give particular weight to persons with insufficient levels of accessibility (Nahmias-Biran & Shiftan, 2016). In a stronger form, the claim of the CA would be that only benefits accruing to persons below the sufficiency level should be taken into account in the assessment of a project or policy. In a weaker form, benefits accruing to persons below the sufficiency threshold would receive a (substantially) higher weight than benefits reaped by persons above the threshold. While the strong claim has drawbacks, most importantly because of the difficulty of setting the

sufficiency level (Casal, 2007), we will explore its consequences for project appraisal in what follows.

4. Case study

This section illustrates the way in which the utilitarian approach and CA, as briefly described in this paper, can be applied for the evaluation of transport projects by a simple case study using a basic synthetic activity-based model, accounting for destination at the upper level and mode choice at the lower level. The utility function represents the traveller's behaviour and preferences. One of the main challenges posed by the CA is to define the notion of capability and threshold for sufficient level of capability. While this is a subject for further research, for this case study we define capability in terms of accessibility to opportunities. Accessibility is thus measured by using the logsum, the expected value of an individual's maximum utility across potentially achievable alternatives a person can reach, given a particular time and money budget, including car availability. We distinguish here between two types of logsums: the logsum of the mode choice model (given a destination) representing the expected maximum utility a person has from the given destination by all modes. This logsum represents the accessibility of the given destination to the individual. According to the CA, we define a threshold value to this logsum, to represent the minimum accessibility to make this destination available to the person. The logsum of the destination choice (upper level model) represents the maximum expected accessibility a person derives from all available destinations and modes.

For this simple examination, we constructed a sample of four representative passengers: two "rich" passengers and two "poor" passengers. These passengers differ in their basic level of accessibility as calculated using logsum obtained at the upper level of the model at the destination choice level (Table 1). In this example, the rich have a high level of accessibility as expressed in short travel times by both car and bus, high car availability, and higher value of time because of higher income. The opposite is true for the poor. They have a low level of accessibility as expressed in long travel times by both car and bus, low car availability, and lower value of time. Table 1 specifies travellers' average travel time by both bus and car to all destinations, and the basic level of accessibility across all destinations, before applying any transportation policy. The average travel cost to all destinations, the number of vehicles available in the household, and the value of time of each passenger are also specified, which taken together differentiate our four individuals from each other in terms of their characteristics and abilities. Our calculations are conducted analytically and, therefore, these four synthetic passengers can represent a much larger population. Our fictive city boosts five different activity areas, and provides two transportation modes: private car and public transport, with the former providing a higher level of service in terms of travel speed and thus travel time.

Table 1. Variable values in our case study.

Person	Value of time (\$/hr)	Number of vehicles	Average travel cost (\$)	Average travel time (min)	Basic level of accessibility
"Rich" 1	60	3	5	34	1.58
"Rich" 2	60	2	5	48	1.53
"Poor" 1	30	0	5	65	1.26
"Poor" 2	30	0	5	54	1.18

At the lower level, we assume a simple synthetic binary logit mode choice (Equations (1) and (2)), and at the upper level, a synthetic binary logit destination choice (Equation (3)), as follows:

$$V_{\text{bus}}^j = \alpha T_{\text{bus}}^j - 0.04 C_{\text{bus}}^j, \quad (1)$$

$$V_{\text{car}}^j = \alpha T_{\text{car}}^j - 0.04 C_{\text{car}}^j + 0.3A, \quad (2)$$

$$V_j = 0.7LS_j, \quad (3)$$

where T_{bus}^j and T_{car}^j are travel time by bus and by car in minutes to destination j , α is the time coefficient for each population group; it equals to -0.02 for the “poor” and -0.04 for the “rich”, C_{bus}^j and C_{car}^j are the travel cost by bus and by car in dollars to destination j , A is the number of vehicles in the household, and LS is the accessibility measure (logsum) to destination j from the mode choice model.

To analyse differences in passengers’ behaviour, time coefficients were synthetically set to reflect common values found in the literature (NCHRP and Cambridge Systematics, 2012). We attached a high time coefficient (-0.04) to the rich passengers and a low time coefficient (-0.02) to the poor passengers. Cost coefficient was assumed to be the same for all persons (-0.04).

4.1. Scenarios

Two hypothetical scenarios were tested. The first one simulates a public transport improvement, by assuming a 25-minute reduction in travel time to each destination by bus. In the second scenario, road improvements are made, resulting in a reduction of 10 minutes in travel time to each destination by private car. We estimated the changes in passengers’ benefits as a result of these scenarios, based on the principles that flow from utilitarianism and the CA to transportation, as examined in Section 3. More specifically:

- (1) Following the utilitarian approach underlying CBA, we compare the two alternatives with the do-nothing scenario based on the total welfare of the population using consumer surplus calculation. Because we are concerned about equity, we also compare the benefits accruing to the two groups of passengers.
- (2) Following the CA, we calculated a person’s ability to reach essential activities. This ability captures a person’s capability – the more essential activities can be reached, the higher a person’s capability to engage in activities. For this purpose, we assume some sufficiency threshold of accessibility, measured using logsum, and examine for each person which destinations pass this sufficiency threshold, for the do-nothing case and the two scenarios. For each scenario, we can thereby assess the improvement in each person’s capability level by counting the number of destinations the person is able to reach.

4.2. Results

Table 2 summarises the results of economic evaluation using the utilitarian approach, for each group separately and in total.

The results indicate that for the second scenario, which consisted of 10 minutes reduction in travel time by car to all destinations, the change in consumer surplus is higher than those obtained for the first scenario, in spite of the larger reduction in travel time in the first scenario. The aggregate results indicate a better performance of the car investment alternative. This result can be explained by the fact that the population choosing to travel by car is dominated by the “rich”. Since they have higher values of time, and their car availability is higher, their impact on the outcomes of the evaluation is stronger. However, when breaking down the results to subgroups, it can be seen that the benefits of the “poor” from the public transport scenario is 1.5 times higher than that from the private car scenario. The opposite is true for the “rich” population: their benefits from private car scenario are two times higher than those obtained from the public transport improvement, as can be seen in [Table 2](#). These results demonstrate the importance of explicitly evaluating the benefits of vulnerable populations when performing economic evaluation. These results also hold when using identical values of time (i.e. equity values of time). While this does narrow the differences in assessment between the two projects and between groups of the same project, it does not change the overall outcome of the evaluation: the private car investment still outperforms the public transport investment.

Following the CA, we based project evaluation on a person’s ability to reach essential activities. This ability is expressed by the number of reachable destinations, that is, destinations that have accessibility (measured by the logsum) higher than some threshold value. It is important to clarify that the absolute values of the logsum, as well as of utility, have no independent meaning. Both can only be interpreted by comparing different values with each other. We assume that there is some logsum value representing a sufficient level of accessibility, as a prerequisite for a sufficient level of capabilities, expressing the essential ability to reach places that are necessary for all daily activities. While setting the sufficiency threshold is a central issue for the realisation of the CA, it is not the focus of this work. We rather focus on how travellers’ limitations affect their realistic choice set. For our example, we set the sufficient level of capabilities at -0.5 . This value is represented by the black line in the spider diagram presented in [Figure 1](#). The figure represents the logsum value out of the mode choice model (thus, the level of accessibility) of each destination (Des 1–5) for our four individuals, before applying any transportation policy. Given the different units of benefits (money in the case of utilitarianism versus number of available destinations in the case of the CA), these measures cannot be directly compared. These measures can only be used to demonstrate how decision rules may look like under the different approaches, for the same model and scenarios. As shown in [Figure 1](#),

Table 2. Project evaluation results when applying the utilitarian approach.

Scenario	Total change in benefits			
	Monetised travel time benefits (\$)		“Equity value of travel time” (\$)	
	“Rich”	“Poor”	“Rich”	“Poor”
Scenario 1 – public transport investment	7.00	8.70	6.70	9.60
Total scenario 1		15.70		16.30
Scenario 2 – private transport investment	13.80	5.90	10.40	9.60
Total scenario 2		19.70		20.00

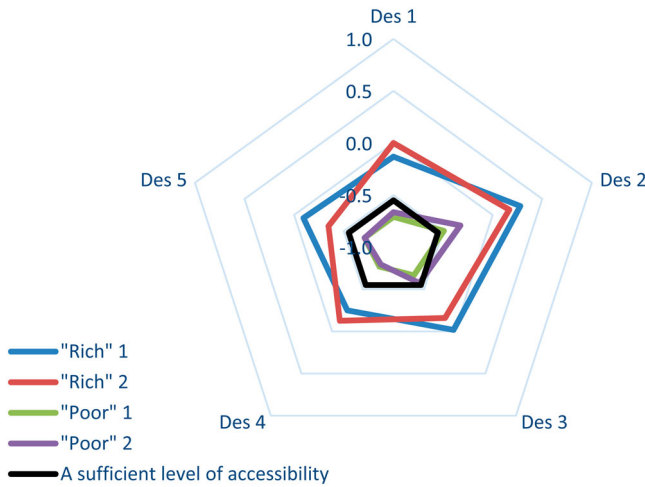


Figure 1. Project evaluation results when applying the CA: accessibility level for each person in the do-nothing scenario.

in the initial situation, "Poor 2" can break through the basic accessibility ring to reach two destinations out of five (destinations 2 and 3), while "Poor 1" is able to reach only one destination out of five (destination 2). This low level of accessibility is the result of no car availability and too long travel times by bus to the other destinations.

"Rich 1" and "Rich 2", on the other hand, have sufficient level of capabilities before the implementation of the improvements as they can pass the basic capability limitation and reach all five destinations. In fact, the rich have much a higher level of capabilities, which means they can choose from a wide range of opportunities.

Figure 2 describes our four individuals' level of accessibility to destinations 1–5 using the logsum measure after applying scenario 1. The results indicate that in this public

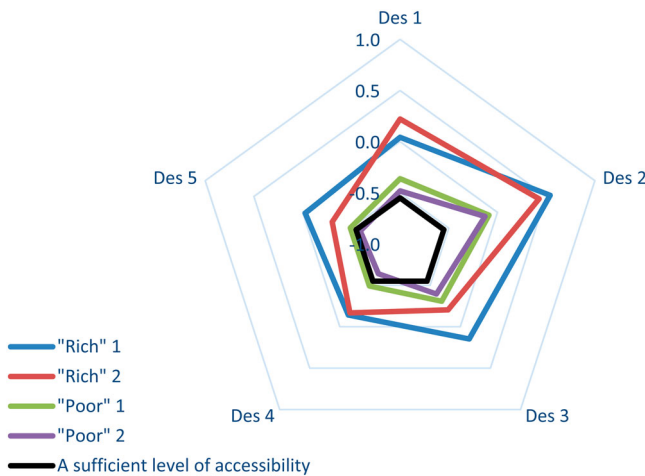


Figure 2. Project evaluation results when applying the CA: accessibility level for each person after applying scenario 1 (public transport improvement).

transport scenario, "Poor 1" manages to expand his reachable destinations and pass the basic level of accessibility that is required to satisfy his basic needs, and reach all five destinations. "Poor 2" also manages to expand his reachable destinations, yet he still fails to reach destination 4. This reform also helps "Rich 1" and "Rich 2" to reach their destinations more easily; however, this is not important from a capability perspective. According to the CA, the focus in estimation has shifted to the populations with a substandard level of accessibility, and whether the policy has led to increase their basic capabilities or not (see Section 3).

Figure 3 describes our four individuals' level of accessibility to destinations 1–5 using the logsum measure after applying scenario 2 (road improvement). In this case, "Rich 1" and "Rich 2" experience an improvement in their situation, but not an expansion of their capability set. As we focus on "Poor 1" and "Poor 2", we see that under this policy "Poor 1" still fails to reach destinations 5 and 4, while "Poor 2" fails to reach destinations 1, 5 and 4. This is due to the fact that the poor in our example do not have access to private cars. Therefore, their accessibility gain from an improvement in the road infrastructure is very small. Overall, according to the CA, the public transport scenario is better than the private transport scenario as it allows the poor to reach more essential destinations. The criteria for choosing a project under this approach turn the focus of evaluation to the persons below the sufficiency threshold. Keep in mind that the threshold value may vary from one society to another, as this level is to be decided by decision-makers and the wider public.

5. Conclusions: implications for project assessment

The integration of equity considerations in economic evaluation requires an understanding of the underlying theories of justice as well as their possible alternatives. Based on our

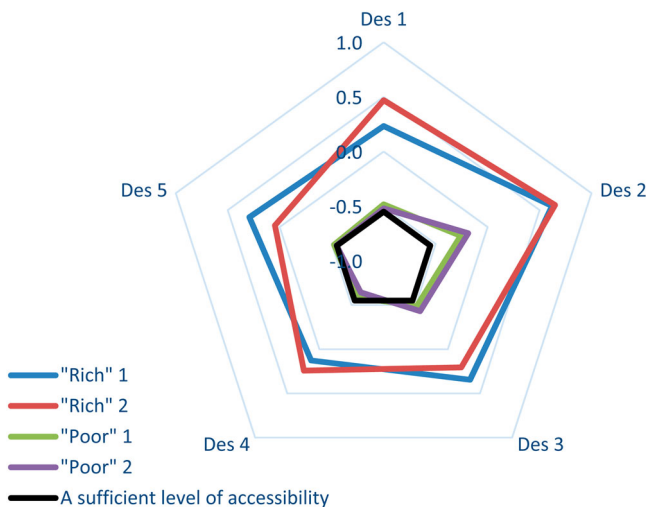


Figure 3. Project evaluation results when applying the CA: accessibility level for each person after applying scenario 2 (road improvement).

review of the conceptual essence of three leading theories and their implications for transport project appraisal, the following conclusions can be drawn.

Our exploration started from the strong criticism on utilitarianism that underlies CBA, which in turn has been the primary method for evaluating transportation projects for decades. The utilitarian approach does not recognise, nor does it allow to estimate the importance of people's opportunities, as its guiding principle is to maximise total fulfilment, lumping together individuals as if they constitute a "single actor". Given these restrictions, the approach cannot account for social justice. Therefore, it is recommended that this approach will not be employed as the moral justification underling the evaluation of transportation projects.

We discussed three alternative approaches: Rawls Justice as Fairness, Walzer's Spheres of Justice, and the CA developed by Sen and Nussbaum. We have concluded that Rawls's and Walzer's theories of justice ascribe special importance to opportunities and their impact on a person's future development, even though we cannot particularise them into an explicit guideline. The CA, in contrast, does provide a powerful argument for an explicit justice principle to employ in transport planning. From the perspective of the CA, and in particular the version developed by Nussbaum, a sufficiency standard for accessibility should be employed as a prerequisite for guaranteeing a sufficient level of basic capabilities.

We are aware that the guidance given by the CA to transport project evaluation is less clear than that provided by utilitarianism. However, the approach provides two important insights: First, the notion of minimum thresholds regarding accessibility; second, the CA requires an assessment of the situation of each and every individual, taking into account the particularities of the person as much as the characteristics of the transport and land-use system. The approach leaves ill-defined what would be the minimum level of accessibility that would be required; this level will vary from one society to another. Following the CA, the minimum level of accessibility should be set through a process of democratic decision-making. This is clearly a topic for further research, which is beyond the scope of this paper.

A simple case study demonstrated the use and the limits of project evaluation based on utilitarianism and the CA. The utilitarian approach showed higher benefits for the investments that favour the "rich", that is, persons with higher initial accessibility. However, when breaking down the results by sub groups, it can be seen that the benefits of the "poor" from the public transport scenario are substantially higher than that measured for the private car scenario, emphasising the importance of explicitly evaluating the benefits of vulnerable populations when performing an economic evaluation. The CA, calculated based on logsum function capturing the ability to reach activities, showed benefits in terms of accessibility gain, that is, the ability to reach destinations. It turns the focus of evaluation to the least-advantaged persons by looking at how many destinations each person can reach. While this case study illustrated the general idea of how to apply the CA to the evaluation of transport projects, it also leaves some questions for further research: How to determine the sufficient level of accessibility? Is it right to assess distributions solely in terms of the number of people who have reached the sufficient level? Once everyone has secured enough, which distributive criteria should be applied?

These questions point at the need to develop a consistent alternative to CBA for assessing transportation projects. In our perspective, this method has to be based on the

evaluation of the opportunities available to a person, and the way a transport system enables persons to reach these opportunities. According to this approach, accessibility will constitute a key measure in the evaluation exercise and the related distribution principle will work to the advantage of persons most poorly served by the available transport system.

Acknowledgements

This work is an outcome of the authors' collaboration in the framework of COST Action TU 1208: Transport Equity Analysis: assessment and integration of equity criteria in transportation planning (TEA). The authors would like to thank the Israel Science Foundation (ISF) and the International Foundation for Education (ISEF) for their financial support.

Disclosure statement

No potential conflict of interest was reported by the authors.

References

- Adeel, M., Yeh, A. G.-O., & Zhang, F. (2016). Transportation disadvantage and activity participation in the cities of Rawalpindi and Islamabad, Pakistan. *Transport Policy*, 47, 1–12.
- Andersson, F., & Lyttkens, C. H. (1999). Preferences for equity in health behind a veil of ignorance. *Health Economics*, 8, 368–378.
- Arneson, R. (2002). *Egalitarianism*. *Stanford encyclopedia of philosophy*. Stanford: Stanford University.
- Ben-Akiva, M. E., & Bowman, J. L. (1998). Activity-based travel demand model systems. In P. Marcotte & S. Nguyen (Eds.), *Equilibrium and advanced transportation modeling* (pp. 27–46). Boston, MA: Kluwer Academic Publishers.
- Beyazit, E. (2011). Evaluating social justice in transport: Lessons to be learned from the Capability Approach. *Transport Reviews: A Transnational Transdisciplinary Journal*, 31(1), 117–134.
- Black, J., & Conroy, M. (1977). Accessibility measures and the social evaluation of urban structure. *Environment and Planning A*, 9, 1013–1031.
- Bommier, A., & Stecklov, G. (2002). Defining health inequality: Why Rawls succeeds where social welfare theory fails. *Journal of Health Economics*, 21(3), 497–513.
- Boucher, D., & Kelly, P. (1998). Introduction. In D. Boucher & P. Kelly (Eds.), *Social justice: From Hume to Walzer* (pp. 1–16). London: Routledge.
- Casal, P. (2007). Why sufficiency is not enough. *Ethics*, 117(2), 296–326.
- Cohen, G. A. (1993). Equality of what? On welfare, goods, and capabilities. In A. K. Sen & M. C. Nussbaum (Eds.), *The quality of life* (pp. 9–29). Oxford: Oxford University Press.
- Dagsvik, J. K. (2013). Making Sen's Capability Approach operational: A random scale framework. *Theory and Decision*, 74(1), 75–105.
- Daniels, N. (1985). *Just health care*. Cambridge: Cambridge University Press.
- Daniels, N. (2008). *Just health: Meeting health needs fairly*. Cambridge: Cambridge University Press.
- Denier, Y. (2007). *Efficiency, justice and care: Philosophical reflections on scarcity in health care*. Dordrecht: Springer.
- Dong, X., Ben-Akiva, M. E., Bowman, J. L., & Walker, J. L. (2006). Moving from trip-based to activity-based measures of accessibility. *Transportation Research A*, 40, 163–180.
- Dworkin, R. (1983). To each his own. *The New York Review of Books*, 30(6), 4–6.
- Eitoku, Y., & Mizokami, S. (2010). An evaluation method of transportation policies by the quality of mobility index based on Capability Approach. *Asian Transport Studies*, 1(1), 77–89.

- Geurs, K., Zondag, B., de Jong, G., & de Bok, M. (2010). Accessibility appraisal of land-use/transport policy strategies: More than just adding up travel-time savings. *Transportation Research Part D: Transport and Environment*, 15(7), 382–393.
- Green, R. M. (1976). Health care and justice in contract theory perspective. *Ethics and Health policy*, 111–126.
- Hansen, W. G. (1959). How accessibility shapes land use. *Journal of the American Institute of Planners*, 25, 73–76.
- Harsanyi, J. (1955). Cardinal welfare, individualistic ethics, and interpersonal comparisons of welfare. *Journal of Political Economy*, 63.
- Hu, L., & Giuliano, G. (2014). Poverty concentration, job access, and employment outcomes. *Journal of Urban Affairs*.
- Inoi, H., & Nitta, Y. (2005). The planning of the community transport from the viewpoint of well-being: Applying Amartya Sen's Capability Approach. *Journal of Eastern Asia Society for Transportation Studies*, 5, 2330–2341.
- Kaldor, N. (1939). Welfare propositions of economics and interpersonal comparisons of utility. *The Economic Journal*, 549–552.
- Khisty, C. J. (1996). Operationalizing concepts of equity for public project investments. *Transportation Research Record: Journal of the Transportation Research Board*, 1559, 94–99.
- Laird, J., Geurs, K., & Nash, C. (2009). Option and non-use values and rail project appraisal. *Transport Policy*, 16, 173–182.
- Levinson, D. (2003). Perspectives on efficiency in transportation. *International Journal of Transport Management*, 1, 145–155.
- Lucas, K. (2012). Transport and social exclusion: Where are we now? *Transport Policy*, 20, 105–113.
- Lucy, W. H. (1981). Equity and planning for local services. *Journal of the American Planning Association*, 47(4), 447–457.
- Macário, R., Filipe, L., Martins, P., & Reis, V. (2007, June). *Urban mobility management: What about distribution of urban goods*. 11th World Conference on Transport Research, Berkely, CA, pp. 24–29.
- Mackie, P. J., Wardman, M., Fowkes, A. S., Whelan, G., Nellthorp, J., & Bates, J. (2003). *Value of travel time savings in the UK: Summary report*. Leeds: Institute for Transport Studies, University of Leeds/John Bates Services.
- Martens, K. (2006). Basing transport planning on principles of social justice. *Berkeley Planning Journal*, 19(1), 1–17.
- Martens, K. (2011). Substance precedes methodology: On cost-benefit analysis and equity. *Transportation*, 38(6), 959–974.
- Martens, K. (2012). Justice in transport as justice in access: Applying Walzer's "spheres of justice" to the transport sector. *Transportation*, 39(6), 1035–1053.
- Martens, K. (2017). *Transport justice: Designing fair transportation systems*. New York, NY: Routledge.
- Martens, K., Di Ciommo, F., & Papanikolaus, A. (2014, June 11–13). *Incorporating equity into transport planning: Utility, priority and sufficiency approaches*. Paper presented at the PANAM Conference, Santander.
- Martens, K., & Golub, A. (2012). A justice-theoretic exploration of accessibility measures. In K. T. Geurs, K. J. Krizek, & A. Reggiani (Eds.), *Accessibility analysis and transport planning: Challenges for Europe and North America* (pp. 195–210). Cheltenham: Edward Elgar.
- Martens, K., Golub, A., & Robinson, G. (2012). A justice-theoretic approach to the distribution of transportation benefits: Implications for transportation planning practice in the United States. *Transportation Research Part A: Policy and Practice*, 46(4), 684–695.
- Miller, D. (1999). *Principles of social justice*. Cambridge: Harvard University Press.
- Nahmias-Biran, B. (2016, June). *Incorporating equity considerations in transport projects evaluation: Developing a new measure* (Dissertation). The Technion, Haifa.
- Nahmias-Biran, B., & Shiftan, Y. (2016). Towards a more equitable distribution of resources: Using activity-based models and subjective well-being measures in transport project evaluation. *Transportation Research Part A: Policy and Practice*, 94, 672–684.
- National Cooperative Highway Research Program, American Association of State Highway, Transportation Officials, & Cambridge Systematics. (2012). *Travel demand forecasting: Parameters and techniques* (Vol. 716). Transportation Research Board.

- Nitta, Y., Inoi, H., & Nakamura, Y. (2004, May 23–26). *Applying Sen's Capability Approach to the evaluation of community buses*. Paper presented at the TRANSED Conference, Hamamatsu.
- Nussbaum, M. C. (2000). *Women and human development: The capabilities approach*. Cambridge: Cambridge University Press.
- Odgaard, T., Kelly, C. E., & Laird, J. (2006). *Current practice in project appraisal in Europe*. Project report. HEATCO. Retrieved from http://eprints.whiterose.ac.uk/2502/1/Current_practice_in_project_appraisal_uploadable.pdf
- Pereira, R. H. M., Schwanen, T., & Banister, D. (2017). Distributive justice and equity in transportation. *Transport Reviews*. doi:10.1080/01441647.2016.1257660
- Quinet, E. (2000). Evaluation methodologies of transportation projects in France. *Transport Policy*, 7(1), 27–34.
- Raux, C., & Souche, S. (2004). The acceptability of urban road pricing: A theoretical analysis applied to experience in Lyon. *Journal of Transport Economics and Policy*, 38(2), 191–216.
- Rawls, J. (1971). *A theory of justice*. Cambridge, MA: The Belknap Press of Harvard University.
- Rawls, J. ([2001] 2003). *Justice as fairness: A restatement*. Cambridge: The Belknap Press of Harvard University Press.
- Rietveld, P. (2003). Winners and losers in transport policy: On efficiency, equity and compensation. In D. A. Hensher & K. J. Button (Eds.), *Handbook of transport and the environment* (pp. 585–602). Amsterdam: Elsevier.
- Ryan, J., Wretstrand, A., & Schmidt, S. M. (2015). Exploring public transport as an element of older persons' mobility: A Capability Approach perspective. *Journal of Transport Geography*, 48, 105–114.
- Scanlon, T. M. (1991). The moral basis of interpersonal comparisons. *Interpersonal Comparisons of Well-Being*, 17–44.
- Sen, A. (1980). Equality of what? In S. McMurrin (Ed.), *Tanner lectures on human values* (Vol. 1, pp. 197–220). Cambridge: Cambridge University Press.
- Sen, A. (1999). *Development as freedom*. New York, NY: Oxford University Press.
- Sen, A. K. (1985). *Commodities and capabilities*. North Holland: Amsterdam.
- Sen, A. K. (2011). *Development as freedom*. New York, NY: Anchor Books.
- Smith, N., Hirsch, D., & Davis, A. (2012). Accessibility and capability: The minimum transport needs and costs of rural households. *Journal of Transport Geography*, 21, 93–101.
- Tavasszy, L., Jonkhoff, W., Burgess, A., Rustenburg, M., & Hunt, A. (2005). *Key issues in the development of harmonised guidelines for project assessment and transport costing*. Retrieved from <http://heatco.ier.uni-stuttgart.de/hd3final.pdf>
- Taylor, B. D., & Norton, A. T. (2009). Paying for transportation: What's a fair price? *Journal of Planning Literature*, 24(1), 22–36.
- Teuber, A. (1984). Bookreview of spheres of justice by Michael Walzer. *Political Theory*, 12(1), 118–123.
- Trappenburg, M. (2000). In defence of pure pluralism: Two readings of Walzer's spheres of justice. *Journal of Political Philosophy*, 8(3), 343–362.
- Tyler, N. (2006). Capabilities and radicalism: Engineering accessibility in the 21st century. *Transportation Planning and Technology*, 29(5), 331–358.
- Van Wee, B. (2011). *Transport and ethics: Ethics and the evaluation of transport policies and projects*. Cheltenham: Edward Elgar.
- Van Wee, B. (2012). How suitable is CBA for the ex-ante evaluation of transport projects and policies? A discussion from the perspective of ethics. *Transport Policy*, 19(1), 1–7.
- Walzer, M. (1983). *Spheres of justice: A defense of pluralism and equality*. New York, NY: Basic Books.
- Wee, B., & Geurs, K. (2011). Discussing equity and social exclusion in accessibility evaluations. *European Journal of Transport and Infrastructure Research*, 11(4), 350–365.
- Weis, C. (2012). *Activity oriented modelling of short-and long-term dynamics of travel behaviour* (Dissertation). Eidgenössische Technische Hochschule ETH Zürich, Nr. 20346, Zurich.
- Weis, C., & Axhausen, K. W. (2012). Assessing changes in travel behavior induced by modified travel times: A stated adaptation survey and modeling approach. *disP-The Planning Review*, 48(3), 40–53.
- Wismadi, A., Zuidgeest, M., Brussel, M., & van Maarseveen, M. (2014). Spatial preference modelling for equitable infrastructure provision: An application of Sen's Capability Approach. *Journal of Geographical Systems*, 16(1), 19–48.