

1. Accessibility, equity and efficiency

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The tension between efficiency and equity has been the focus of major debate since equity aspects started to be considered as part of project evaluation procedures (Thomopoulos et al. 2009). In this book, we contribute to the debate by focusing on the links and trade-offs between accessibility, economic efficiency and equity in both the developed and developing country contexts. Accessibility is a concept that has been central to physical planning and spatial modelling for more than 50 years. Accessibility can be viewed as a product of the land use and transport systems, and describes the extent to which land use and transport systems enable (groups of) individuals to reach activities or destinations by means of a (combination of) transport mode(s) (Geurs and van Wee 2004). From the literature it is clear that accessibility is linked to economic efficiency and equity. In general, increased accessibility resulting from a transport project is considered an important user benefit for people and firms. A traveller can make a trip at less cost or greater convenience; there might be less congestion, and more destinations may be reached in the same time. For firms, firstly, a reduction in interaction cost may increase efficiency of production (that is, time saved can be used in productive activities), and may become more competitive and attract more customers. Secondly, improved commuting conditions may improve the labour market, giving rise to improved productivity. However, the linkage between accessibility and spatial economic development is not straightforward. The economic effects are the result of a complex pattern of effects leading in different directions, not all of which are intuitively obvious. For example, improved accessibility between two countries, cities, areas or regions may sometimes benefit one of them to the disbenefit of the other (SACTRA 1999; Banister and Berechman 2001). There are thus also equity issues at stake.

In recent years, there has been growing attention to the equity impacts of transport developments and transport projects, and in particular to using accessibility indicators to capture equity impacts. However, equity analysis is not straightforward. Firstly, the term is often not well defined

and 'fairness' and 'justice' are usually used interchangeably, depending on the context. Within transport infrastructure appraisal additional terms are used, including 'solidarity' or (territorial or spatial) 'cohesion' (Thomopoulos et al. 2009), adding a further degree of ambiguity. Secondly, transportation equity analysis can be difficult because there are several types of equity, various ways to categorize people for equity analysis, numerous impacts to consider, and various ways of measuring these impacts (Litman 2002; van Wee and Geurs 2011). Often a distinction is made between equity of opportunity, or process equity (the extent to which there is fair access to the planning and decision-making process), and equity of the outcome, or result equity (the extent to which consequences of a decision are considered just) (Levinson 2010).

Within outcome equity analysis related to transport and accessibility there are several dimensions across which equity can be quantified, for example horizontal equity, vertical equity, social and spatial or territorial equity, and generational equity (see, for literature overviews, Thomopoulos et al. 2009; Levinson 2010). Horizontal equity is the extent to which individuals within a class (for example, income, gender, ability, race) are treated similarly. Vertical equity is the extent to which members of different classes are treated similarly. Social equity refers to the distribution of impacts by population segments that differ in abilities and needs, for example by income, social class, age or ability to travel. Spatial equity refers to the spatial distribution of impacts, for example by region or city. In social equity it is often assumed that everyone should enjoy at least a basic level of access, even if people with special needs require extra resources and subsidies. A basic level of access implies that people can obtain goods, services and activities that are considered valuable to society, such as emergency services, medical care, education, employment, food and clothing.

To quantify outcome equity, statistical indicators are often used. Well-known indicators are the Gini, Theil and Atkinson indices. These have, for example, been used to measure the effects of changes in accessibility measures resulting from road pricing strategies (e.g., Ramjerdi 2006; Souche et al. 2016). These studies show that different inequality indicators produce contrasting and sometimes contradictory results, and results may differ at different geographical scales.

Reducing equity and promoting economic efficiency are often conflicting goals. For example, to provide all individuals and relevant population groups a basic level of access by providing public transport services to remote areas and/or giving public transport subsidies to specific population groups (the elderly, disabled and so on) is often not economically efficient. There is thus an ethically relevant discussion as to what a basic level of accessibility constitutes, or a minimum level of participation in society,

below which a problem exists that legitimates or necessitates policy. This at least to some extent is a political issue, a political choice. The choice may vary over place and time, and between persons with different political preferences (van Wee and Geurs 2011). Concerns about equal rights of access to various services or other fundamental aspects of human life have been researched for many years, and from the time of Aristotle several theories have emerged. Two fundamental theories seem to dominate in *ex ante* transport and accessibility evaluations in practice (Thomopoulos et al. 2009; van Wee and Roeser 2013). Utilitarianism theory most dominated in practice as it reflects the backbone of welfare economics and cost-benefit analysis (CBA), but at the same time utilitarianism and CBA have been heavily debated by social scientists and philosophers. Alternatively, several egalitarian theories have been developed emphasizing that everyone has equal rights or benefits for a particular service or scheme. The approaches by John Rawls, Amartya Sen and Martha Nussbaum are the most well-known egalitarian theories (see e.g., Van Wee and Geurs 2011; Van Wee 2011), but other less well-known theories such as Michael Walzer's 'Spheres of Justice' are also used in the academic literature to provide theoretical foundations for a distributive approach to transport (Martens et al. 2012). In the planning practice, however, there seems to be fairly little attention for justice-oriented accessibility analyses and planning. This also holds for countries such as the United States and the United Kingdom which are at the forefront of countries with policy attention for the equity implications of transport. In the US transport-related environmental justice regulations were introduced in the 1990s. Martens et al. (2012) review the US transport planning practice and conclude that only a few metropolitan planning organizations in the United States actually measure or invoke the distribution of access. These authorities, even those with the most sophisticated analysis techniques, however, fail to define a well-founded goal against which to assess the results of the analysis. In the UK, transport-related social equity policies and guidelines have been developed, driven by a social exclusion policy agenda. Local transport authorities have been required to undertake strategic and local accessibility planning since 2006 (Lucas 2012). The lack of well-founded goals and indicators also seems problematic in the UK planning practice. Halden (2011) reviews the UK accessibility planning process and states that because of the flexibility offered within accessibility planning and the plethora of potential measures which can be deployed, many local authorities have yet to find an optimal balance in the range, choice and calculation approach for indicators. Moreover, Lucas (2012) concludes that accessibility mapping tools used in planning practice have tended to underplay the complexity of the lived travel experiences of socially excluded individuals, and overlooked other important barriers for social exclusion.

Part II of the book comprises a set of chapters linking population accessibility and equity issues. In Chapter 2 Boris Portnov investigates whether accessibility factors tend to grow or decrease over time in terms of development and population priorities. He looks at the evolution of the relation between municipal development in Switzerland, taken as a relative measure of population size, and accessibility of Swiss municipalities, from 1950 to 2000, and concludes that relative lack of access limits relative growth, and that private accessibility to public infrastructures has an increasing role in that. Summing up, accessibility still matters for development. Chapters 3 and 4 focus on the issue of rural depopulation and accessibility. Paulo Anciães (Chapter 3) studies the population decline in the interior of Portugal and concludes that accessibility can act either as a push or a pull factor in the countryside areas, and that this can be seen in indicators that capture different components of the effects. For Norway, David McArthur and his colleagues (Chapter 4) use a numeric model to look at the iterative and cumulative effects that relate population changes not only to migration of basic employment but also to housing prices and labour market accessibility, that interfere with the process; they accomplish the interesting result that local accessibility and housing prices do have a role on location population patterns at regional and national levels. From this it seems that local accessibility, and related housing prices, appear to play an important role on the effects of overall accessibility in regional development.

The issues addressed in Part III are related to measuring equity in access to daily activities and services. Chapter 5 explores the impact of local accessibility in development and welfare, looking into the impact of mobility costs – connected with oil prices – on the different segments of an urban population, focusing on the case of the Munich urban area. Benjamin Büttner and his co-authors conclude by making some recommendations on how households can become less exposed to oil shocks by having access to different types of accessibility alternatives: public transportation, car sharing and teleworking. The allocation of public services is complementary to the provision of infrastructural accessibility and, for developing countries, important issues that influence the spatial patterns of growth and, necessarily, the sustainability of development and accessibility; this is the theme exploited by César Pakissi and Tomaz Dentinho in Chapter 6, where they focus on the impacts of the equity of different patterns of rational spatial allocation of public services.

Part IV of the book focuses on the efficiency of railway systems. In many countries, government policies aim to improve accessibility by subsidies or public investments. The liberalization of the US railroad system led to considerable increases in its economic efficiency, and thereby transferred

traffic from the roads, producing wider transportation and environmental benefits. Chapters 7 and 8 highlight that the performance of passenger rail transport depends upon the quality of local transport to access the stations. The argument is proved in Chapter 7, by Andrés Monzón and colleagues, for the high speed route of Madrid–Cuenca–Valencia–Alicante where it is shown that the quality of the accessibility at local level reflects the potential of the accessibility of the modern railway because access and egress to the station play a crucial role in the overall accessibility. This same theme is addressed in the work of Lissy La Paix and Karst Geurs (Chapter 8), who present discrete choice models based on joint revealed preference and stated preference data to identify the main components of access and egress mode choice to train stations in the Netherlands. They examine the effectiveness of different types of measures to increase station access (for example, bicycle parking pricing, ‘liveliness’ of railway stations in terms of cafés, restaurants and so on) for increasing train ridership. The results show that train ridership strongly depends on the quality of feeder modes and station facilities. In addition, the freight sector is subject to economic regulation by national governments because of the monopolistic tendency and strategic importance of the industry. Kenneth Button and colleagues in Chapter 9 examine the effects of deregulation on the efficiency of the US freight railroads.

Part V of the book includes contributions for the evaluation of transport investment and implications for accessibility. In Chapter 10, Paul Mogush and co-authors provide some clarifying input for investments in bicycle trails. They show that trails must be adapted to the type of neighbourhood to get the optimal solution for bicycle trails, because some of these trails can reduce the value of houses. Finally, Chapter 11, written by Mert Kompil and his colleagues, proposes and applies transport accessibility measures for Europe; the aim is to develop a framework to assess impacts of various policy options and transport infrastructure investments on accessibility at the European level. Daily accessibility was found to be the most suitable and effective measure to assess transport investments paid by European Cohesion Funds, revealing once more the importance of local accessibility.

In summary, the contributions in this book from researchers show that accessibility models, firstly, help to explain spatial and transport developments in developed and developing countries; and secondly, are powerful tools to explain the equity and efficiency impacts of urban and transport policies and projects.

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