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The insider: A planners' perspective on accessibility

Geneviève Boisjoly, Ahmed M. El-Geneidy*

School of Urban Planning McGill University, Suite 400, 815 Sherbrooke St. W., Montréal, Québec H3A 2K6, Canada

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ABSTRACT

Accessibility, the ease of reaching destinations, is a key land use and transportation performance measure that has been studied for decades by researchers. Nevertheless, its use by practitioners is generally limited. The goal of this study is to explore the challenges and opportunities experienced by land use and transportation practitioners to use accessibility metrics in their work. In order to achieve this objective, a survey on the use of accessibility metrics was conducted among 343 practitioners around the world. Findings from the survey show a gap between knowledge of the concept of accessibility and its use by land use and transportation practitioners. While 90% of the respondents are familiar with the concept, only 55% stated that they use accessibility metrics in their work. Whereas lack of support and interest does not appear to be a major obstacle to using accessibility metrics, lack of knowledge and data are highlighted as the main barriers to the use of metrics in practice. These results suggest that further training and collaboration is required to support the use of metrics by practitioners. Furthermore, including clear accessibility indicators in planning documents is key to promoting the use of metrics in policy and practice, as it was stated as a main reason motivating the generation of accessibility metrics. This research highlights potential avenues to support the integration of accessibility metrics in practice and is of relevance to researchers, planners and policy-makers wishing to foster accessibility-based planning approaches.

1. Introduction

Accessibility, the ease of reaching destinations, is a key land use and transportation performance measure (Wachs and Kumagai, 1973). It is increasingly used by researchers to spatially assess the joint benefits provided by the transportation network and the land use system in a region (Huang and Wei, 2002; Kawabata and Shen, 2007; Bocarejo and Oviedo, 2012; Manaugh and El-Geneidy, 2012) and to identify spatial gaps in access to opportunities (Paez et al., 2010b, 2010a). Understanding and visualizing accessibility patterns and changes across a region contributes to developing spatially targeted land use and transportation interventions. While accessibility has been extensively researched with the ultimate purpose of informing decision-making and influencing land use and transportation planning, little is known on the use of accessibility metrics in transportation practice. In fact, although transportation issues are increasingly framed in terms of access to opportunities (Preston and Rajé, 2007; Handy, 2008; Geurs et al., 2012; Lucas, 2012; Manaugh et al., 2015), accessibility is still largely marginalized in practice (Levinson and Gillen, 2005; Halden, 2011; Proffitt et al., 2015). More specifically, accessibility goals are increasingly incorporated in transportation plans, but the use of performance indicators reflecting the ease of reaching destinations is limited (Handy, 2008; Proffitt et al., 2015; Boisjoly and El-Geneidy, 2017).

The aim of this study is, therefore, to explore the challenges and opportunities experienced by a variety of land use and transportation practitioners with respect to the use of accessibility metrics in their work. This study assesses the familiarity with and use of the concept and metrics as well as the motivations and barriers to using accessibility metrics among 343 practitioners from around the world, mainly North America and to a lesser extent Europe. In order to achieve the study aim, a survey on the use of accessibility metrics was conducted among land use and transportation practitioners through an on-line platform. This study contributes to a greater understanding of the practical challenges related to the use of accessibility metrics by practitioners. Understanding such challenges is essential to bring accessibility indicators into practice, and accordingly provide planners and decision-makers with performance indicators to spatially assess the benefits provided by land use and transportation improvements. This study is of relevance to researchers, planners and policy-makers wishing to foster accessibility-based planning approaches.

2. Literature review

Accessibility, defined as the ease of reaching destinations (Preston

* Corresponding author.
E-mail addresses: genevieve.boisjoly@mail.mcgill.ca (G. Boisjoly), ahmed.elgeneidy@mcgill.ca (A.M. El-Geneidy).

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and Rajé, 2007), is one of the most comprehensive performance measures of land use and transportation systems (El-Geneidy and Levinson, 2006). As such, accessibility reflects the multiple benefits provided by land use and transportation systems (Ben-Akiva and Lerman, 1979). For example, greater accessibility is associated with higher land values (Koenig, 1980; El-Geneidy and Levinson, 2006; Du and Mulley, 2012) and employment rates (Ornati et al., 1969; Pignatar and Falcocch, 1969; Sanchez, 1999; Blumenberg and Ong, 2001; Sari, 2015; Tyndall, 2015), as it provides residents with greater access to a variety of opportunities. In the same way, increased accessibility contributes to reducing the risks of social exclusion for vulnerable individuals (Preston and Rajé, 2007; Lucas, 2012). Furthermore, accessibility by transit is associated with greater transit use (Chen et al., 2008; Owen and Levinson, 2015b), and can thus help in reducing car use and the resulting greenhouse gas emissions (Levinson, 1998; Handy, 2002). Accessibility improvements can also have negative impacts on individuals. For example, increased accessibility can lead to neighborhood gentrification, as it is often associated with increase in land values, and adversely affect low-income residents. Furthermore, congestion is often associated with areas with high levels of accessibility (Mondschein et al., 2011). Nonetheless, as accessibility comprehensively reflects the outcomes of land use and transportation systems, it is increasingly put forward as a key element of a transportation planning (Handy, 2002; Banister, 2008; Straatemeier, 2008).

Accessibility is contingent on a variety of interacting factors. Firstly, access to destinations is largely influenced by the distribution of residential, economic, cultural and social activities (the land use component). Accessibility further depends on the transportation network which determines the travel time, costs and convenience from a place (for example, home) to another (for example, work) (the transport component). In addition to the exogenous factors, individual characteristics such as income, level of education, gender and vehicle ownership affect one's abilities and needs to access destinations (the individual component). Time restrictions also play an important role in determining accessibility. These include land use, transport and individual constraints such as the availability of opportunities (i.e., opening hours), personal schedules, and the schedule of public transport services.

Given the wide scope of factors affecting accessibility, multiple and diverse accessibility metrics have been developed (Handy and Niemeier, 1997; Geurs and van Wee, 2004; Miller, 2005; Paez et al., 2012), differing in their level of disaggregation and their ease of operationalization. Person-based measures of accessibility are generated at the individual level, and are concerned with the level of accessibility experienced by a specific person (Geurs and van Wee, 2004; Miller, 2005; Owen and Levinson, 2015b). These measures incorporate the characteristics of the land use and transportation systems, as well as the spatial and temporal constraint of the individual into a single measure (Miller, 2005). Person-based measures are helpful in understanding individual experiences of accessibility, but entail significant challenges to assess land use and transportation systems at a regional scale. A second type of measures is the utility-based measures, which capture the economic benefits provided by changes in the network. Utility-based measures account for most components of accessibility and can be included in traditional cost-benefit analysis (van Wee, 2016). Yet, these measures are rarely used in practice due to the challenges related to their interpretability and communicability (van Wee and Geurs, 2016).

In contrast, location-based metrics are most commonly used in planning as they provide a comprehensive measure of regional accessibility (Boisjoly and El-Geneidy, 2017). These metrics indicate the ease of accessing destinations from a specific location and accounts for the spatial distribution of opportunities (for example, jobs or healthcare services) and the ability to move from one place to another (Geurs and van Wee, 2004). The transport component, the ability to move from one place to the other, is generally mode specific and based on travel time or distance (Hansen, 1959; Vickerman, 1974; Handy, 1994; Geurs and van Wee, 2004; Owen and Levinson, 2015a). A common location-based metric is a measure of cumulative-opportunities, which counts all opportunities that can be reached within a travel costs threshold. For example, the number of jobs that are within 45 min of travel times by transit from a specific place is used to assess the access to jobs by public transit. Another common metric is the gravity-based measure, which discounts opportunities based on a distance-decay function. Accordingly, opportunities that are located farther (by distance or time) receive less weight than closer opportunities. While this measure is more reflective of travel behavior, cumulative-opportunities are simpler to generate, interpret and communicate.

Although accessibility has been extensively researched, its inclusion in transportation planning is limited; the mobility-based approach still dominates transportation planning (Levinson and Gillen, 2005; Halden, 2011; Proffitt et al., 2015). This approach, which traditionally focused on motorized traffic, aims at facilitating the smooth movement of vehicles. In this regard, the goal is to minimize travel times by increasing travel speeds and reducing travel delays. Within this approach, interventions are generally develop to meet the demand through improvements on the network, while neglecting the land use components that can contribute to improving access to destinations. This approach is widely used for car traffic, but also for public transport and cycling. Through a detailed assessment of four transportation plans in California, Handy (2005) found that although accessibility emerged as a concern in most plans, these plans were still dominated by a mobility-oriented paradigm. Similarly, in an assessment of 42 American transportation plans, Proffitt et al. (2015) found that less than a quarter of the plans measured success based on accessibility indicators. In the United Kingdom (UK), the national government has established a framework for accessibility planning. However, the broad and flexible guidelines resulted in a “misuse” and “abuse in practice” of accessibility (Halden, 2011). Research has also shown that there is a lack of consensus on the accessibility indicators to be used in transportation evaluations (Halden, 2011; van Wee, 2016).

Increasing interest is given to accessibility metrics as a tool to better integrate land use and transportation planning and to address issues of geographic access to opportunities. While many studies have focused on accessibility metrics and indicators, no study has, to our knowledge, looked into the use of accessibility metrics by practitioners. Yet, understanding how and to what extent accessibility indicators are used in practice is essential to bridge the gap between planning and research, and to foster the implementation of accessibility-oriented planning approaches.

3. Data and methodology

To explore the factors influencing the use of accessibility metrics in practice, a survey was conducted among land use and transportation practitioners. The survey was conducted on-line, and disseminated through various mailing lists and social media groups of planners. The main goal was to identify practitioners that use accessibility in their work and determine the motivations and barriers behind generating accessibility metrics. Since this study is mainly concerned with the use of accessibility metrics in land use and transportation planning, the survey focused on location-based metrics. As discussed above, these metrics address the characteristics of the land use and transport systems at a regional level and are most commonly used in the planning realm given their ease of interpretation and communication.

The selection and subdivision of respondents included in this study are presented in Fig. 1. In total, 440 fully completed surveys were collected. As the objective was to focus on land use and transportation planning practice, only land use and transportation practitioners were included in the sample. The term land use and transportation practitioners is broadly used to refer to any individual involved with land use and/or transportation planning and does not include individuals mainly