Chapter 2

Developing a Sustainable Urban Mobility Index: Methodological Steps

Yongjun Shen
Hasselt University, Belgium

Elke Hermans
Hasselt University, Belgium

ABSTRACT

Sustainability is a multi-dimensional concept that can be assessed by means of constructing a composite indicator or index. In doing so, a scientifically sound and appropriate index methodology is required. The research proposed in this chapter aims to provide a guideline for developing a sustainability index that is able to assess the impact of mobility on the urban quality of life. By studying the index development process in other domains critically and taking the specific sustainable urban mobility context into account, this study investigates the different methodological steps that are essential in the construction of a sustainable urban mobility index. The main challenges and potential options when developing such an index are discussed.

INTRODUCTION

The world's population is increasingly city-based. In 2014, the urban population accounted for 54% of the total global population, up from 30% in 1950, and is expected to reach 67% by 2050 (United Nations, 2014). This explosion in urban population has been accompanied by a massive growth in both passenger and freight transport. Today, 64% of all travel undertaken is within urban environments and the total number of urban kilometers travelled is expected to triple by 2050 (van Audenhove, Korniichuk, Dauby, & Pourbaix, 2014). Urban mobility has become a crucial component of modernity, and has generated a revolution in contemporary economic and social relations. However, rapid growth of urban mobility systems has also presented a big challenge to all major city authorities around the world, that is, how to enhance mobility while at the same time reducing congestion, accidents, and pollution (Camagni,

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Gibelli, & Rigamonti, 2002; Mihyeon Jeon, & Amekudzi, 2005). Taking the European Union (EU) as an example, a large majority of European citizens live in an urban environment, with over 60% living in urban areas of over 10,000 inhabitants. As a consequence, congestion in the EU is often located in and around urban areas and costs nearly 100 billion Euro, or 1% of the EU GDP, annually. Moreover, urban mobility in the EU accounts for 40% of all CO_2 emissions of road transport and up to 70% of other pollutants from transport (European Commission, 2015). Under this circumstance, the European Commission proposed in its Action Plan on Urban Mobility of 2009 to accelerate the take-up of a Sustainable Urban Mobility Plan (SUMP) in Europe, which has the central goal of improving accessibility of urban areas and of providing high-quality and sustainable mobility and transport to, through and within the urban area (Wefering, Rupprecht, Buhrmann, & Bohler-Baedeker, 2014). In short, to preserve the liveability of urban environments, the mobility system needs to move towards sustainability. To this end, a thorough understanding and assessment of the current performance of the urban transport system is required (Black, Paez, & Suthanaya, 2002; Yigitcanlar, & Dur, 2010). However, because sustainability is a complex matter that is affected by numerous factors, no single indicator is capable of capturing the entire picture. Consequently, the development of a composite indicator (CI), which combines individual indicator values into an overall index score, is considered to be a valuable approach for evaluating urban mobility sustainability (Mori, & Christodoulou, 2012).

Theoretically, a CI is a mathematical aggregation of a set of individual indicators that usually has no common units of measurement. The main pros and cons of using CIs are summarized in Saisana & Tarantola (2002) and the Organization for Economic Co-operation and Development (2008). For instance, CIs enable users to compare complex realities effectively and are easier to interpret than trying to find a common trend in many separate indicators. However, they may also invite simplistic policy conclusions or be misused to support a desired policy. In general, "… it is hard to imagine that debate on the use of composite indicators will ever be settled…" (Saisana, Tarantola, & Saltelli, 2005). However, if the methodological process for creating an index is scientifically sound, transparent, and based on solid statistical and conceptual principles, then the construction of a CI over a set of indicators is worthwhile. The index can be utilized as a powerful tool for policy analysis and public communication (Shen, Hermans, Bao, Brijs, Wets, & Wang, 2015).

To develop a sustainable urban mobility index, a reasonable definition of the research framework, an appropriate selection of sustainability indicators, a harmonized data collection and processing procedure, and a scientifically sound approach for weighting and aggregation are indispensable. These are the fundamental conditions for meaningful evaluation, and also the key to designing more effective policies towards sustainability. In this chapter, by studying the index development process in other domains critically and focusing on the specific sustainable urban mobility case, we aim to offer some insight into the various steps of the methodology for the development of a sound sustainable urban mobility index. The different methodological aspects involved in the index construction process are elaborated, and the main challenges and potential options when developing such an index are discussed.

CURRENT STATUS

During the last decades, all the major international organizations such as the United Nations (UN), the Organisation for Economic Co-operation and Development (OECD), the World Health Organization (WHO), and so on, have been producing CIs in wide-ranging fields such as economy, society, governance,

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