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Identifying the methodological characteristics of European green city rankings

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ABSTRACT

City rankings that aim to measure the environmental sustainability of European cities may contribute to the evaluation and development of environmental policy of European cities. The objective of this study is to identify and evaluate the methodological characteristics of these city rankings. First, a methodology was developed to systematically identify methodological characteristics of city rankings within different steps of the ranking development process. Second, six city rankings (European Energy Award, European Green Capital Award, European Green City Index, European Soot-free City Ranking, RES Champions League, Urban Ecosystem Europe) were examined. Official websites and any methodological documents found on those websites were content analyzed using the developed methodology. Interviews with representatives of the city rankings were conducted to acquire any additional information. Results showed that the city rankings varied greatly with respect to their methodological characteristics and that all city rankings had methodological weaknesses. Developers of city rankings are advised to use the methodology developed in this study to find methodological weaknesses and improve their ranking. In addition, developers ought to be more transparent about the methodological characteristics of their city rankings. End-users of city rankings are advised to use the developed methodology to identify and evaluate the methodological characteristics of city rankings before deciding to act on ranking results.

1. Introduction

Today many different rankings exist which are often used as a tool for influencing national and international policy debates (Kern, 2008). All these rankings consist of two or more objects that have been ordered based on their performance on certain attributes. Rankings are transitive in the sense that if object A is ranked higher than object B, and object B is ranked higher than object C, then object A is ranked higher than object C (Jones, 1971). The ordered objects are usually given ascending rank numbers (starting with 1 for the highest ranked object). These rank numbers indicate if an object performs better or worse than another object, but they do not provide any information concerning the extent to which an object performs better or worse than another object. This means that even when the ranks of two objects are wide apart, the difference between their actual attribute values may still be very small (Jones, 1971).

Ratings differ from rankings in that each object is assigned an actual attribute value on some pre-defined scale (Lange, 2010). As such, ratings do provide information concerning the extent to which an object performs better or worse than another object. Ratings can easily be converted to rankings by ordering the objects based on their attribute values and replacing the attribute values with rank numbers. Both rankings and ratings operationalize the performance of objects on an attribute using an indicator system (Lange, 2010). Such a system consists of several indicators each measuring the performance of the objects on one aspect of the attribute. For each object, the measured indicator values are aggregated to calculate one composite index value that reflects the attribute value. By summarizing the performance of an object into a composite index value and corresponding rank number, rankings make it easy to discern how well an object performs in comparison to the other objects included in the ranking. However, multiple studies showed that composite indices, and thus rankings, have some methodological issues concerning among others: the definition of the ranking attribute (Wilson et al., 2007), the selection

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of indicators (Maretzke, 2006), the aggregation of indicators into a composite index (Jacobs et al., 2005; Schwengler and Binder, 2006), data availability (Almeida et al., 2001), and data quality (Ochel and Röhn, 2008). Various methodological choices within the ranking development process can severely influence the final ranking outcome.

Different kinds of objects are ranked based on different kinds of attributes. The World University Rankings (Quacquarelli Symonds, 2013) ranks universities based on their performance on 30 subject areas, while the Environmental Performance Index (Nesshöver et al., 2007) ranks countries based on the performance of their environmental policy. Since the late 1980s different rankings emerged that rank cities based on their quality of life, business climate, or market potential (Chapman and Pike, 1992). Rankings are subject of scientific and political debate (Buela-Casal et al., 2007). Because of methodological issues, controversies exist about the extent to which rankings reflect the actual performance of objects on the ranking attribute (Ham et al., 2004). Rankings oversimplify the performance of objects, causing misinterpretation and misuse by unwary end-users (Espeland and Sauder, 2007; Taylor, 2011). Furthermore, they may incite objects to manipulate data (Espeland and Sauder, 2007; Rauhvargers, 2011). Nonetheless, city rankings may contribute to the evaluation and development of urban policy. According to Schönert (2003) city rankings help trigger a discussion process about regional development strategies and stimulate cities to learn from each other. Grabow (2006) stated that city rankings may aid cities in making strategic decisions, while Besecke and Herkommer (2007) argued that city rankings give insight into the strengths and weaknesses of cities and may therefore be used for city planning and development.

In the European Union almost 75% of the population lives in cities. Therefore, the European Union is committed to make its cities more sustainable (European Union, 2010). Multiple city rankings have been developed that specifically focus on measuring the environmental sustainability of European cities. Take for example the European Green Capital Award, the European Green City Index and Urban Ecosystem Europe. These European city rankings may contribute to the evaluation and development of environmental policy of European cities. Like rankings in general, city rankings have some methodological issues (Besecke and Herkommer, 2007; Grabow, 2006; McManus, 2012; Schönert, 2003). A serious problem of city rankings is that their methodological characteristics are rarely considered (Giffinger et al., 2007a). This includes city rankings that aim to measure the environmental sustainability of European cities. Because of methodological differences, a city may have a high position in one ranking and simultaneously a low position in another ranking. For example, Vienna ranked fourth place (out of 30 cities) in the European Green City Index 2009 and thirteenth place (out of 35 cities) in the European Green Capital Award 2010 (which was also published in 2009). The sensitivity of city ranking outcomes to methodological choices obviously poses problems for urban environmental policy makers. The objective of the current study is therefore to identify and evaluate the methodological characteristics of existing city rankings that aim to measure the environmental sustainability of European cities. The knowledge from this research may be used to help urban policy makers deal with European city rankings and to improve the methodological quality of (future) city rankings.

2. Literature review on city ranking methodology

The development of a city ranking consists of several phases: the decomposition of the ranking attribute into indicators, the aggregation of indicators into a composite index, the selection of cities, the data collection, and the reporting. Literature was reviewed to identify methodological issues within each phase and to develop a methodology for systematically identifying the methodological characteristics of city rankings. The literature that was reviewed is discussed below.

2.1. Decomposition of the ranking attribute

To measure a city's performance on a complex ranking attribute, the ranking attribute needs to be decomposed into indicators. For example, to measure a city's environmental sustainability, indicators concerning air quality (e.g. annual daily mean of PM_{10} emissions), energy consumption (e.g. annual energy consumption in gigajoules per resident), and waste production (e.g. annual waste collected in kilograms per resident) could be used. Ideally, the decomposition of a ranking attribute into indicators is based on a theoretical framework (Giovannini et al., 2008; Ham et al., 2004). Such a framework should provide a clear definition of the ranking attribute, including its underlying categories and criteria for selecting indicators (Giovannini et al., 2008). Remarkably, rankings sometimes do not provide a (clear) definition of their ranking attribute (see Nesshöver et al. (2007) for an example). This obviously complicates the justification of the selected indicators.

The selection of indicators may also be justified by the use of stakeholders or experts (Morse and Fraser, 2005; Singh et al., 2009). Experts can be acquired from within the organization that initiated the ranking (and its project partners) or they can be acquired from outside. It is important to make this distinction, because the use of internal experts may more easily bias the indicator selection than the use of external and perhaps more independent experts. The selection of indicators may also depend on political and practical considerations. Developers of rankings may choose to align their selection of indictors with certain policy frameworks or discard the use of indicators for which data is not readily available. Especially in the context of international rankings, data availability is a severe selection criterion due to the scarcity of internationally comparable data (Giovannini et al., 2008). When comparing and ranking cities across countries, data availability also poses a problem (Kahn, 2006; Türksever and Atalik, 2001).

Usually, developers of rankings can choose from a wide range of indicators. For example, when measuring CO_2 emissions many different indicators could be selected (e.g. total CO_2 emissions in tonnes per resident, total CO_2 emissions in grams per unit of cities' gross domestic product). As such, developers of rankings need to select a limited number of indicators that still captures the meaning of the ranking attribute as a whole (Grabow, 2006). It is important that developers justify their specific selection of indicators, because it can severely influence the final ranking outcome (Lun et al., 2006; Maretzke, 2006).

With regard to the methodological characteristics of city rankings, a clear definition of the ranking attribute is pivotal. Without such a definition it is impossible to determine if appropriate indicators were selected. Some definitions of urban environmental sustainability and closely related concepts are provided in the literature. According to Kahn (2006, p. 4) green cities have clean air and water, are resilient in the face of natural disasters, run a low risk of major infectious disease outbreaks, encourage green behaviour, and have a relatively small ecological impact. Goodland (1999, p. 715) defined environmental sustainability as the 'maintenance of natural capital', with natural capital as a provider of inputs (e.g. air, water, energy) and as a sink of waste emissions (e.g. greenhouse gases). Others defined urban environmental sustainability by decomposing it into categories such as air, water, energy, and solid waste (Shane and Graedel, 2000; Yu and Wen, 2010). Although there are similarities between definitions, one widely accepted definition of urban environmental sustainability does not yet exist. Therefore, European green city rankings should clearly state and