



Sustainability on the urban scale: Proposal of a structure of indicators for the Spanish context



Marta Braulio-Gonzalo*, María Dolores Bovea, María José Ruá

Department of Mechanical Engineering and Construction, Universitat Jaume I, Av. Sos Baynat s/n, 12071 Castellón, Spain

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ABSTRACT

Some efforts to assess sustainability on the urban scale have been made and different tools for measuring the impact on and caused by cities have emerged. However, the sustainability concept varies from region to region, and indicators to measure it should be suitable for the context-specific conditions of the region under study. After doing a comprehensive review of the indicators included in 13 tools developed to assess urban sustainability of cities, this article proposes a new structure of indicators adapted to a Mediterranean city in Spain. The proposed structure is based on a two-level scheme that consists in 14 categories and 63 subcategories, which agglutinate urban sustainability indicators according to their purpose. This structure suggests a set of comprehensible qualitative and quantitative indicators that are easily applicable on neighbourhood or city scales. Given the similar features of Mediterranean countries in terms of environmental and socio-economic aspects, the proposed structure could be extrapolated to other countries with climatic and cultural similarities. Otherwise, the system is a useful tool in the decision-making process to help the different stakeholders involved in new urban developments and regeneration projects in existing neighbourhoods, such as developers, urban planners and public administrations.

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1. Introduction

While urban responses to climate change and impacts have been recently identified and recognised, the relationship between cities and climate change has been increasingly targeted by the research community (Castán and Bulkeley, 2013). Urban centres are now considered to form a vital part of the global impact response (UN-Habitat, 2011). Thus tools to measure the impact of urban ecosystems components are required (Dizdaroglu and Yigitcanlar, 2014) to assess urban sustainability in its three dimensions: environmental, social and economic.

The situation is not always straightforward since cities are complex and rigid systems, where their biological and physical complexities interact with each other. Existing conditions (e.g. urban planning, building blocks and zoning of uses) are not easy to change. However, cities must be able to adapt to external shocks and meet the changing demands of society in order to approach the resilient city concept (Pickett et al., 2014). Moreover, urban population growth and the rural exodus to cities have led to a rapid expansion of European cities in recent years, particularly in Spain. This has led to disorganised planning where efforts strongly focused on land use optimisation as an economic asset, instead of taking into account the conservation of those environmental and cultural issues (Rueda et al., 2007).

When a new district is projected, it is possible to conduct an accurate design with sustainable development premises from very early stages (Gil and Duarte, 2013). In contrast, the circumstances for existing neighbourhoods are quite different, where most physical conditions are static and cannot be easily modified. However, it is still possible to work on many aspects of such built neighbourhoods, which may greatly improve the livability and reduce the impact generated on both the environment and population.

It is necessary to do an analysis from the sustainability perspective to organise all the aspects surrounding the city and the interaction among them, and to thus identify the key topics that must be addressed in any new urban development or in existing neighbourhood intervention.

Since the emergence of the term Sustainable Development (Brundtland, 1987), many efforts have been made by the community to measure the level of sustainability of an urban system through indicators (OECD, 2014). Since the mid-1990s, research into the urban context has focused on municipal strategies and policies, predominantly in North America and Europe, and many policy implementation challenges have been faced by local authorities (Bulkeley, 2010). The first indicators of sustainable development stemmed from a recommendation made by Agenda 21 (United Nations, 1995). This recommendation was to identify and develop indicators of sustainable development that could provide a solid basis for decision making at all levels (regional, national and international) and to also include the incorporation of a suitable set of these indicators into common databases that are widely accessible and regularly updated (UN Sustainable Development, 1998).

* Corresponding author.

E-mail addresses: braulio@uji.es (M. Braulio-Gonzalo), bovea@uji.es (M.D. Bovea), rua@uji.es (M.J. Ruá).

Table 1

Main characteristics of the urban sustainability assessment tools under study.

Tool	Developer	Country/region	Year public.	Last version	Reference	Scope	Accredited assessor	Rating system
LEED ND	United States Green Building Council (USGBC) Congress for the New Urbanism (CNU) Natural Resources Defense Council (NRDC)	US (adaptable to other regions over the world)	2006	2009	US GBC (2009a), US GBC (2009b)	The whole neighbourhood including residential and non-residential buildings. New developments and regeneration projects.	Optional	Platinum \geq 80 Gold \geq 60 Silver \geq 50 Certified \geq 40
BREEAM Communities	Building Research Establishment Ltd (BRE Global)	UK (adaptable to other regions over the world)	2007	2011	BRE Global (2011a), BRE Global (2011b)	Urban scale including residential and non-residential buildings, new developments and regeneration projects	Required	Outstanding \geq 85 Excellent \geq 70 Very Good \geq 55 Good \geq 40 Pass \geq 25 Unclassified < 25 Excellent (BEE \geq 3) Very Good (BEE \geq 1.5) Good (BEE \geq 1) Fairly Poor (BEE \geq 0.5) Poor (BEE < 0.5)
CASBEE UD	Japan Sustainable Building Consortium (JSBC) Japan Green Building Council (JaGBC)	Japan (applicable to Japan and other Asian regions)	2006	2007	IBEC (2007)	Groups of buildings and outdoor surrounding spaces (excluding the interior of buildings). New and regeneration projects	Required	–
ECOCITY	European Commission Ph. Gaffron, G. Huisman y F. Skala (Coordinators)	Europe (7 European countries: Austria, Spain, Hungary, Finland, Slovakia, Germany, Italy) (applicable in European context)	2002–2005	2005	Gaffron et al. (2005), Gaffron et al. (2008)	Neighbourhood and city scale Applicable to European context	The system provides optional consultancy, but not compulsory	–
<i>Le Modele INDI-RU 2005</i>	SUDEN (<i>Association européenne pour un développement urbain durable</i>). The coordinators of the project SUSI-Man are: -Catherine Charlot-Valdieu, La CALADE (<i>Conseil et Recherche en Développement Durable</i>) -Philippe Outrequin, SUDEN	France (adaptable to other regions over the world)	2005	2010	Charlot-Valdieu and Outrequin (2005)	Neighbourhood and city scale	–	–
The BRIDGE project (Sustainable Urban planning Decision support accounting for Urban metabolism)	European Community's Seventh Framework Programme (FP7/2007–2013). 14 partners: Foundation for research and technology- Hellas King's College London Consiglio Nazionale delle Ricerche Instytut Ekologii Terenów Uprzemysłowych Technical University of Madrid University of Aveiro	Europe (5 European cities involved: Helsinki, Athens, London, Firenze, Gliwice)	2013	2013	Chrysoulakis et al. (2013), González et al. (2013)	Neighbourhood and city scale	–	–

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