Ecological Indicators 66 (2016) 121–131

Contents lists available at ScienceDirect

Ecological Indicators

journal homepage: www.elsevier.com/locate/ecolind

# Functional sustainability indicators

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ARTICLE INFO

*Article history:*
Received 29 March 2015
Received in revised form 11 January 2016
Accepted 17 January 2016

*Keywords:*
Performance measurement
Planning
Cities
Governance
Communities

ABSTRACT

Sustainability indicators (SIs) are not just traditional performance metrics but are value laden pathways to supporting urban development. This paper presents a functional classification for SIs. The following six classes are used to illustrate the various functions of SIs: (F1) *Political and Operational*; (F2) *Problem Recognition and Awareness*; (F3) *Justificatory*; (F4) *Monitoring Control and Reporting*; (F5) *Normative Guidance*; (F6) *Communication and Opinion Forming*. The Houston Sustainability Indicators (HSI) program was used as a heuristic case study of how the functional classification could be applied. F1 was illustrated by carefully choosing geographic boundaries for the study. F2 was highlighted by careful review of the socio-economics of persons in the Food Desert. F3 was demonstrated by a look at issues of calculating population growth totals and also setting standards for access to parks. F4 was illustrated by a look at Employment figures. F5 was highlighted by a look at affordability in Houston. Lastly F6 was explained by a look at income inequality. This paper is intended to strengthen the importance of sustainability in development planning, through the illustration of key functions for SIs.



## 1. Introduction

Sustainability indicators (SIs) are value laden measures of development performance designed to measure and calibrate progress toward sustainable development goals. We have seen the proliferation of a range of types of programs (Maclaren, 1996; Tanguay et al., 2010). Some of the various names for SI programs are 'Indicators', 'Metrics', 'Indicator Reports', 'Community Indicators', 'Existing Conditions Reports', 'State of Place Reports', 'Health Assessment Reports', etc. The problem is that the range of types and lack of common content among the reports, suggests that agencies could benefit from guidance on what is expected from SI programs. This lack of standards also highlights a need to develop a functional classification regarding the intended use and/or resource opportunity of the SIs to help to determine the requisite components of the programs.

Functional classification is here defined as the discrete framing of outcome values and purposes through which SIs can be classified. Basic to this process is the recognition that sustainable development involves inclusion of several principles, frameworks and objectives such as the Brundtland Commission definition of sustainable development; the Brundtland Commission report, 'Our Common Future' (WCED, 1987); the program of action, titled 'Agenda 21', with its 27 principles and 39 different themes in the four major areas of social and economic development, conservation and management of natural resources; strengthening the roles of major groups; and implementation for sustainable development (UNCED, 1992). It becomes necessary then to determine how performance measures can be characterized within sustainable development in a logical and meaningful manner, through for instance the functional classification designed in this paper.

This paper develops a functional classification of SIs, which may be helpful to standardize the many and varied programs planned or under development. The basis for the functional classes, are key citations from various sources on the outcome values and purposes of SIs. Results from the case study of the Houston Sustainability Indicators (HSI) program, will be used to support definitions of the functional classes. It is hoped that the functional classes developed in this paper would be useful for agencies and researchers to further the knowledgebase on developing SI programs, which meet the intent of sustainable development.

## 2. Background

### 2.1. Performance measurement and sustainable development

Using urban performance data to drive public policy can be beneficial through explicit inclusion in policy or through three other methods. Those are improving technical capacity, empowering views through enhanced reliability of facts and changing the terms

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http://dx.doi.org/10.1016/j.ecolind.2016.01.027
1470-160X/

of normative discourse on topics in urban policy (Innes, 1988). Scholars have suggested quotes, such as the preceding by Innes (1988), which could be used to develop functional classes for SIs for as long as data has been used to drive public policy. The use of measurement systems for tracking performance became widespread in the US starting in the 1990s. At that time strategic planning and results oriented management was being implemented and improvements were recognized in the public sector (Osborne and Gaebler, 1992; U.S. Congress, 1993). Performance measurement has a singularly defined focus on positivist[1] roots. It is defined as "...the regular measurement of results (outcomes) and efficiency of services or programs" (Hatry, 2006, p. 3). However, although singularly defined, the functions of performance measurement programs can be manifold (Innes, 1988). Recently we have had major successes in all levels of government with implementing performance measurement programs.

The theoretical justification for the use of performance measures can be found in the positivist approach to theory, which is a focus on empirical quantitative analysis. However although SIs depend on empirical analysis, in terms of producing forecasts and trends toward sustainability, they are also accompanied by a deterministic blueprint for achieving sustainability based on concern for explicit balance between social, economic and environmental forces. This substantive concern for ethics and public policy can be considered value laden determinism, as opposed to physical determinism (Bohl, 2000; Fainstein, 2000). Herbert Gans argues that these types of concerns are more intrinsic to the development of human settlements than physical determinism (Bohl, 2000).

The 1970s and 1980s were focused on debates between positivist scientific analysis and materialist political economy. Then the surge of ideas from the 1990s was a move from logical positivism toward a substantive concern for ethics and public policy (Fainstein, 2000). Therefore we can see that sustainable development practitioners have had their paradigm for value laden determinism since the 1970s when the idea originated. It was not until late 1980s when value laden determinism for sustainable development was codified in the form of the Brundtland commission report (WCED, 1987). The entire premise for sustainable development was built around adding value[2] to the practice of development.

### 2.2. SI definition, principles, frameworks, criteria

The Brundtland Commission report released in 1987 codified the term Sustainable Development (WCED, 1987). At the Earth Summit in 1992, another document was developed, which established a program of action for sustainable development. The program of action, titled 'Agenda 21', is preceded by a declaration, which presents 27 principles of sustainable development. It also outlines 40 different themes in the four major areas of social and economic development, conservation and management of natural resources; strengthening the roles of major groups; and implementation for sustainable development. Chapter 40 of the program of action calls for the development of Sustainability Indicators (United Nations, 1992).

The first set of 134 SIs were published in 1996 by the UN Department of Economic and Social Affairs (UN DESA) with a national level focus of developing a central list of indicators to enable country to country comparisons. These indicators were organized using a framework to capture interrelationships between the indictors. The framework used was the driving force-state-response method (DSR).[3] It is important to point out that employing a framework was the initial basis of selecting indicators since characterization was the fundamental basis for selecting indicators (UN, 1996). After consultation and testing between 1996 and 1999, another framework called the Theme/Sub-theme (TST) framework was recommended to more fully capture policy issues and main issues related to sustainable development. This set of 58 indicators was organized as themes and sub-themes under the four separate pillars of social development, economic development, environmental development and institutional development (UN, 2001). The most current iteration of national level indicators contains 96 indicators, with 50 considered core indicators. The TST framework is still recommended, but division of indicators among the four pillars (social, economic, environmental, institutional) is no longer included (UN, 2007). Other types of frameworks include capital frameworks, accounting frameworks, aggregated indicators, and goal-indicator frameworks.

While work was being conducted at the international level, to develop a suite of SIs that could be adopted by all countries, other efforts were being conducted to both define and develop SI programs for local level application (Elgert and Krueger, 2012). The focus was on developing the ideal indicator based on defined criteria of each indicator (Harger and Meyer, 1996; Hart, 1999; Innes and Booher, 2000; Holman, 2009). Work has been contributed to developing indices to better understand findings and to simplify reporting (Mori and Christodoulou, 2012). Another path of research is focusing on the process of developing indicators such as stakeholder integration and rationally ordered procedures (Bell and Morse, 2008; Maclaren, 1996; Moussiopoulos et al., 2010; Magee and Scerri, 2012). Yet another focus is analysis of requisite components of indicator programs (Portney, 2002; Berke and Manta-Conroy, 2000).

For the purpose of this research, one can summarize most of the literature on SI to-date as focused on the figurative anatomy/structure of SIs (Singh et al., 2012). Therefore a focus on the figurative physiology/function of SIs is suggested as a major determining factor in deciding how indicators should be selected (Brugmann, 1997b). There has not been much work done on the figurative physiology of SIs, aside from concluding or framing approaches to studies directed toward figuratively anatomically focused SI research (Hezri and Dovers, 2006; Yli-Viikari, 2009). For example most research papers on the topic conclude or begin with well crafted statements on why SIs are important and how they could be useful. It is precisely the referencing of these statements that forms the basis for the development of the functional classification presented in this paper. Statements such as, Innes' (1988) three points on the beneficial aspects of using data to drive public policy, will be developed in the form of a functional classification for SIs in this paper.

Section 3 of this paper outlines the development of the functional classification for SIs. Following this discussion, Section 4 presents findings and experiences from the Houston Sustainability Indicators project as a case study to highlight application of the various functions of the presented classification system. Section 5 concludes the paper and contextualizes the findings in the literature.

[1] Positivism is the term given to the philosophical position that emphasizes data and scientific methods. In the 17th century the work of Francis Bacon provided the foundation for this tradition. In the 18th century, John Locke and David Hume and George Berkeley were the primary exponents of this philosophy.

[2] This value can be defined as equal consideration of social, economic and environmental impacts.

[3] The term driving force represents human activities, processes, and patterns that impact on sustainable development either positively or negatively. State indicators provide a reading on the condition of sustainable development, while response indicators represent societal actions aimed at moving toward sustainable development.