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A method to assess the relevance of sustainability indicators: Application to the indicator set of the Czech Republic's Sustainable Development Strategy

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ABSTRACT

The goal of this article is to critically review the state-of-the-art in assessing the quality of sustainability indicators and contribute to the development of a suitable methodology for that. We start with a broad review of the vast body of work in this field – in both practice and academic research. We show that both scientists and practitioners have sought developing and using methods for assessing quality of the indicators. They have usually defined some criteria for that; however, neither science nor practitioners have provided major support by developing reliable as well as practical and operative methods for indicator assessment. Therefore, we propose an innovative new method for indicator assessment from the perspective of their relevance. We operationalize this criterion and apply it to the environment-related indicators from the set used for the evaluation of the Czech Republic's Sustainable Development Strategy.

1. Introduction

An important impulse for developing sustainable development indicators arose from the 1992 World Summit in Rio. Agenda 21, adopted at the conference, expressed the need to formulate indicators in order to better monitor and foster sustainable development. Another of the conference outcomes was the foundation of the United Nations Commission on Sustainable Development (UNCSD) with the goal to assist countries in developing and using sustainable development indicators (UNCSD, 2001). Interest and various activities related to sustainable development indicators among many international organizations have increased in the past years. The Organization for Economic Cooperation and Development has developed and published indicators for both particular areas (resource use and environmental outlook), sectors (households or transport) as well as developed a standardized indicators-based framework for countriesĭ environmental performance review (OECD, 2005). The United Nations Environment Programme has regularly published the Global Environmental Outlook, which has used a set of indicators to underline the choices available to policymakers across a range of environmental, social and economic challenges (UNEP, 2007). At the regional level, the European Environmental Agency (EEA) has intensively developed and used indicators for assessment of the European environment. It has developed both concrete indicators for many environment-related areas as well as provided its member countries with methodological and technical assistance. The statistical body of the European Union – Eurostat – established a Working Group in 2001 to respond to the demand for measuring progress towards sustainability with a set of agreed indicators (Eurostat, 2009).

A number of intergovernmental organizations and national governments, but also regional and local authorities, local communities, business organizations and other economic actors, academic institutions and civil society organizations of many kinds, are currently developing and using sets (sometimes called dashboards) of sustainability indicators. At present, hundreds of different indicators have been suggested and are used in many varied contexts, by different users and for diverse purposes: Riley (2001) speaks about an indicator explosion in this context. No exhaustive account probably exists but we can assume the existence of hundreds of various indices and sets of indicators or even several thousands of such metrics if individual indicators are included (OECD, 2002; European Communities, 2004; UNDP, 2005). While sustainability indicators are used ever more extensively and intensively by a wide range of users and in many different contexts, it does not necessarily follow that they are scientifically sound and/or used appropriately.

The goal of this article is to critically review the state of the art in assessing the quality of sustainability indicators and contribute to the development of a suitable methodology for that. We conducted a quite comprehensive review of the vast body of work in this field – in both practice and academic research. We used the review to highlight the abundance of criteria and various frameworks for the assessment but also a serious lack of

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practical guidelines for both the indicator developers and users. Therefore, after the introductory section and the review of existing approaches towards evaluating sustainability indicators, we provide a description of the newly proposed assessment method. In face of its originality, we decided to test it and demonstrate its feasibility on selected indicators used for measuring sustainable development in the Czech Republic. Then, we provide arguments for the use of this method as well as an explanation of results. At the end, we conclude by offering our recommendations of needed (useful) directions in development of indicators for the Czech Republic's Sustainable Development Strategy.

2. Indicator assessment efforts – a review

2.1. Research into the assessment/evaluation of sustainability indicators

The Bellagio Principles, trying to harmonize the process of sustainable development implementation, drafted ten principles to provide a link between theory and practice in sustainability measurement (Hardi and Zdan, 1997). Despite the fact that the follow-up activity – the Bellagio STAMP – looks at indicator evaluation much more closely, it still stays at a level of general guidelines not readily applicable in practice (see more in Pintér et al., 2012).

Regardless of the amount and character of criteria, the methodology underlying the elaboration and development of indicators should fit scientific standards, which imply a procedure of validation (Girardin et al., 1999). Bockstaller and Girardin (2003) proposed a methodological framework to validate environmental indicators. It is based on experience of developers of simulation models and on a definition of validity as the adequacy for a specific purpose. The indicator will be validated if it is scientifically designed, if the information it supplies is relevant and if it is useful and used by end users. Cloquell-Ballester et al. (2006) proposed a methodology for indicator validation that requested that indicators be based not only on thorough scientific foundations but also on recognized social content. It means that the methodology also incorporates public participation to support consensus building. The methodology verifies suitability of indicators in three stages: self-validation (done by the developers themselves), scientific validation (independent experts' judgment) and social validation (public participation). Validation is viewed as a multicriteria multiexpert decision problem. The core of the validation is to assess the correct performance of new indicators from three fundamental views: conceptual coherence, operational coherence and utility. An index is calculated for each, and then, the three indices are aggregated into a final score. As a result, a new indicator is classified into several (at least two) categories: credible indicators (validated); non-credible indicators (non-validated). Since this methodology does not depend on the nature of the indicators, the authors suggest using it for validation of indicators also in other areas such as development studies, health or international cooperation. In addition, Niemeijer and De Groot (2008) call for a transparent selection of the best available indicators. They suggest that the selection be based on (i) a conceptual framework, (ii) individual and set level criteria, and (iii) selection methodology.

Parris and Kates (2003) proposed a theoretical analytical framework that distinguishes among goals, indicators, targets, trends, etc. They suggested that various measurement methods might be characterized by three attributes: salience, credibility and legitimacy. A salient indicator provides relevant information responding to people's concerns; it measures progress against policy goals by comparing indicator values to targets; it answers pertinent questions; it is simple to interpret, accessible and publicly appealing; and it clearly informs about the extent of the issue(s) represented.

This review resulted in a quite poor outcome, which indicates underdevelopment and underestimation of the importance of this issue by the scientific community. The lack of research and development of a methodology and guidelines for assessment of indicator quality has been stressed by several authors (e.g., Bockstaller and Girardin, 2003; Bauler, 2012). More evidence is gained when talking to many organizations that suffer from floating in a vacuum in this respect instead of having a solid base for justification of indicator quality. The International Council of Scientific Unions (ICSU) realized this problem and together with other organizations, it emphasized the need to focus scientific attention on this issue by organizing a large project called the "Assessment of Sustainability Indicators" (Hak et al., 2007).

2.2. Organizations' attempts to evaluate/assess quality of their indicators

Many organizations have recently developed and used indicators for various reporting tasks. In fact, reporting requirements – requirements to provide information agreed between countries and international bodies such as the European Environmental Agency, OECD or international conventions – have increased to such an extent that they also generate a great demand on the quality of exchanged data and information (often in the form of indicators) (EEA, 2010).

The United Nations Public Administration Network (UNPAN) has information at the core of its mission (UNPAN, 2000). In order for its information to be of any use to the interested public, it needs to meet high quality standards. In the UNPAN's view, this quality has several dimensions, including relevance of the content, credibility of the source, originality, timeliness and neutrality. Although well-defined theoretically, the validation criteria are far from being ready to use.

Eurostat may serve as an example of an organization that has proposed and applied a set of criteria for indicator selection and/or assessment (Ledoux et al., 2005). Indicators should: capture the essence of the problem and have a clear and accepted normative interpretation; be robust and statistically validated; be responsive to policy interventions but not subject to manipulation; be measurable in a sufficiently comparable way across Member States, and comparable as far as practicable with the standards applied internationally by the UN and the OECD; be timely and susceptible to revision; and not impose on Member States, on enterprises, nor on the Union's citizens a burden disproportionate to their benefits.

Due to the policy needs and the need to have at least some metainformation on indicator quality, Eurostat has taken a pragmatic approach and the criteria have been applied with some flexibility. It has been preparing "indicator quality profiles", user-oriented summaries of the main quality features of indicators. Quality is defined along several dimensions; therefore, the quality profile aims at a quick overview on how far an indicator is deemed "fit for use" with regard to its key objectives. The scope of the quality profiles, e.g., for structural indicators, is as follows: Feasibility (by looking at timeliness and coverage); Technical soundness (comprising overall accuracy and comparability over time and across countries) and Reliable sources meeting high standards and involving statistical expertise. The quality profile also discusses relevance, which is considered to comprise the content and suitability of the indicator to measure appropriately the phenomenon considered (Eurostat, 2010). Although the evaluation is qualitative in nature (and thus loaded with subjectivity), it tries to give an unambiguous formalized picture of the quality of the indicator.

Similarly, the European Environmental Agency has developed a set of criteria to be used for evaluating its indicators (EEA, 2005). Unlike many other organizations, it has operationalized them to some extent. The quality of each indicator has been evaluated using