Contents lists available at ScienceDirect

Ecological Indicators

Sustainability indicators: A tool to generate learning and adaptation in sustainable urban development

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ABSTRACT

The pursuit of sustainable development as an adaptive process of learning-by-doing may benefit from using sustainability indicators (SIs). Nevertheless, adaptive governance may demand more from SIs than what these indicators can currently deliver. In response, we identify three conditioning factors for SIs to indeed support processes of adaptive governance in pursuing urban sustainability. These conditions relate to the accessibility and understandability of SIs, their focus on policy performance and trend watching, and finally, whether they are being discussed both within and outside government authorities. We empirically provide further grounding for the relevance of these conditions and identify how they relate to existing practices working with SIs. We targeted six urban practices in four countries (Belgium, Denmark, the Netherlands and the USA) with advanced experience in sustainable development policies and SIs. These practices confirm the relevance of each condition and show evidence of how they might be operationalized in practice. However, confirmation and evidence are largely implicit and based on isolated examples. Hence, we conclude that there is a lack of explicit recognition and, in its wake, a lack of structured attempts at embedding SIs in urban governance for supporting processes of learning and policy adaptation.

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1. Introduction

This paper questions how sustainability indicators (SIs) might become effective tools in supporting adaptive governance. The paper understands the pursuit of sustainable development as an adaptive process of learning-by-doing, and subsequently argues that the role of SIs may be relevant in supporting this process. Rather than being mere tools to measure assumed 'degrees of sustainability', SIs can be important for informing processes of learning and adaptation. The paper proposes that SIs have the potential to be important tools in the governance of urban sustainability by helping planners and policymakers to learn about ongoing trends, successes and failures in their policies, and to respond to changing desires and priorities among their constituents.

The development of SIs began with the intention of showing progress in achieving sustainability ambitions and gaining an overview of the state of a city's environment (e.g., Hamilton and Atkinson, 1996). As such, SIs were directly linked to possibilities to operationalize and define sustainable development. After being introduced into mainstream governance debates, sustainable development was first promoted as a long-term policy goal that allows the balancing of economic, social and environmental ambitions in a holistic strategy. In spite of this, the optimism that surrounded sustainable development during the early 1990s has faded somewhat. Even in the 1990s, sustainable development attracted criticism for being too vague and abstract to have a practical meaning (Richardson, 1997). Hence, sustainable development proved difficult to put into practice (Briassoulis, 1999; Jordan, 2008) and made the use of SIs in measuring the progress of sustainable development similarly problematic. Since then there has been a reframing of sustainable development. Instead of being considered as a static long-term goal to be pursued in a linear fashion, sustainable development was proposed as a more general direction for inspiring change via an adaptive process of learning-by-doing (Ahern, 2011; Carpenter et al., 2001; Folke et al., 2002; Walker and Holling 2004). Rather than defining the precise meaning of sustainable development, the phrase would instead provide a more general direction for evaluating and adjusting policies, plans and eventually, urban structures and functions.

Seeing sustainable development as a process of learning-by-doing resonates with debates on uncertainty and complexity that have found their way into planning and policy sciences (e.g., Connick and Innes 2003; De Roo and Silva, 2012; Innes and Booher

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2000). We tap into these debates by highlighting the complex and thus unpredictable processes of change that affect governance and its capacity to pursue societal ambitions (de Roo, 2012). Non-linearity and more general debates in the complexity sciences have helped policymakers to understand why the future cannot be fully controlled. These debates reveal that uncertainties are not just the result of a limited ability to fully grasp the many interrelated processes in society and our physical environment. Rather, the complexity sciences show us a world in a constant state of 'flux' where even complete knowledge would not result in clarity regarding the exact trajectories of change. The complexity sciences have forced planners and policy scientists to accept that, to a certain degree, governance will always have to be adaptive if it is to cope with these uncertain trajectories of change (e.g., de Roo and Porter, 2012; Folke et al., 2002).

Adaptive governance emphasizes a flexible, experimental and adaptive process of governance (Duit et al., 2010; Holling, 1978; Lee, 1999). As such, adaptive governance moves beyond a linear process of policy interventions intended to achieve predetermined policy objectives. Instead, the idea is for policies and their supportive regulatory or institutional frameworks to be continuously adapted to newly emerging knowledge or circumstances. Therefore, a central element within debates on adaptive governance is learning. This learning can follow not only from a keen monitoring of ongoing societal and physical developments, but also from evaluating the effects of common or experimental policy interventions. Having access to timely, relevant and clear information is an obvious requirement for such learning and thus for adaptive governance. Although we certainly acknowledge that adaptive governance moves far beyond a need for timely, relevant and clear information, here, we will specifically target this requirement while focusing on SIs.

The aim of this paper is to identify and empirically assess the conditions needed for SIs to support processes of adaptive governance in the pursuit of urban sustainability. Thus far, the literature has provided few specifications and little empirical grounding for how SIs might support adaptive governance. Therefore, the first step is to use existing academic work on SIs and adaptive governance to identify if and how SIs can be used to support adaptive governance for urban sustainability. Reflection on these academic debates has led to the identification of three key conditioning factors for SIs to indeed support processes of adaptive governance in the pursuit of urban sustainability (as explained in section two). Subsequently, the paper empirically assesses how a selection of existing cities and regions currently manage these conditioning factors with the goal of providing further grounding for the relevance of these conditions. In section three, the paper investigates six case studies in four countries where work on urban sustainability is relatively advanced: Belgium, Denmark, the Netherlands and the United States. Section four discusses the main results of the study. In section five, there is a reflection on the potential for SIs to inform processes of learning and adaptation. The paper then concludes by returning to the value of the previously identified conditioning factors.

2. A role for SIs

SIs were developed during the 1990s with the ambition to "provide a solid basis for decision-making at all levels and to contribute to a self-regulating sustainability of integrated environment and development systems" (UN, 1992 p.346). This 'solid basis,' as Hamilton and Atkinson (1996) also explain, meant that indicators would show progress in achieving sustainability targets and inform decision-makers as well as the public about the current state of a city's or region's environment in a suitable and policy-relevant

manner. Nevertheless, the initial development of SIs remained predominantly expert-driven and focused largely on the technical design of indicators (e.g., Bossel 1999; Bell and Morse, 1999; Mitchell 1996; Spangenberg, 2002). The result was the production of standalone databases of SIs that often had no explicit link to local policies (e.g., Bell and Morse, 2001). Rather than being the desired 'solid basis,' SIs became marginalized for being too technical and largely irrelevant for use in urban governance (Pires, 2011).

The strong focus on the technical design of indicators led to several studies on SIs in the second half of the 1990s highlighting the need to link SIs and urban governance (Bell and Morse, 2001; Hezri, 2004, 2006; Lehtonen, 2012; Rosenström, 2006; The Pastille Consortium, 2002). A first logical step was to improve this link and to ensure that SIs were actually comprehensible and considered relevant by their envisioned users (Rosenström, 2006; Shields et al., 2002). Several studies subsequently emphasized that SIs should be directly connected to existing policies and the process of developing new policies. If SIs could provide information directly linked to such policies then they could potentially function as a relevant and useful basis for more effective decision-making and for reviews of policy performance (Bell and Morse 2001; Brugmann 1997; Singh et al., 2012). Other studies argued that SIs should not just be relevant and comprehensible for administrators and governmental parties, but should also inform alternative stakeholders and the general public on progress towards sustainable development objectives. This argument followed the idea that governments are increasingly forced to rely on the participation of multiple societal groups and stakeholders to make decisions (e.g., Jordan et al., 2000; Lemos and Agrawal 2006). SIs should therefore see all these groups and stakeholders as their potential users. If well-designed, the argument continued, SIs could even be tools to help engage stakeholders by providing policy relevant and expert-driven information for societal debates over policy agendas and objectives (Shields et al., 2002). The result, as Bauler (2012) states, is that "in order to become consistently influential, indicators need to be perceived simultaneously – consensually – by a group of policy actors as being legitimate, credible and salient" (p.40). Heink et al. (2015) explains legitimacy as meaning 'acceptability' or 'perceived fairness' and credibility as referring to the truthfulness of information, i.e. validity, consistency and quality of data. Therefore, well-designed SIs are not only constructed to be relevant or considered salient to stakeholders, but also to have legitimacy, be accepted as fair and to be considered credible and trustworthy. SIs can be made more salient and credible if they are presented with relevant information and a comprehensive explanation. Accessibility can also help to verify and enhance the perceived fairness and legitimacy of the indicators. This reasoning results in a first, and perhaps predictable, conditioning factor: if SIs are to be used to support learning in urban governance, then they should be accessible, comprehensible and considered relevant by both governmental and non-governmental parties.

2.1. Adaptive governance

The rise of debates on adaptive forms of governance urges us to move beyond this first and almost obvious condition factor. Underlying adaptive governance is the acceptance that change is not only inevitable but also only partially predictable. As Beck (2006) explains, surprises are inevitable in a world of continuous and non-linear change. To a certain extent we know that we can expect surprises, mostly because we have gained awareness of what we do not yet know, which Beck calls 'known unknowns'. However, we often lack awareness of the kind of surprises we might face, which Beck calls 'unknown unknowns'. Consequently, planners and policy scientists have come to accept that governance must always be