DEVELOPING A METHODOLOGICAL FRAMEWORK FOR THE PARTICIPATORY MEASUREMENT OF SUSTAINABILITY

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ABSTRACT

The measurement of sustainability can provide significant information in order to plan and implement environmental policies. Several methods have been proposed in the literature in order to select the appropriate indicators along with a variety of techniques for their measurement. These methods are often divided in two main categories: a) a top-down approach where the selection of sustainability indicators is often based on the decision of scientists and policy-makers and b) a bottom-up approach where local stakeholders influence the selection and the measurement of indicators. In this paper we propose a methodological framework which allows the selection of sustainability indicators based on scientific research but at the same time allows citizens to influence both the selection of indicators and their measurement. The benefits of the specific methodological framework are two: a) to incorporate in different stages of the measurement the opinions of local stakeholders, b) to assist in policy decision-making through the assessment of the current situation of sustainability.

Keywords: socio-economic indicators, participatory measurement, environmental indicators

1. Introduction

Sustainable development refers to '*meeting the needs of present generations without jeopardizing the ability of futures generations to meet their own*' (WCED, 1987). Incorporating sustainable development principles is a priority for national, European and international public policies. A fundamental aim is to be able to find the right balance between economic development, securing social justice and minimizing environmental degradation.

In order to be able to incorporate sustainability principles in public policy strategies it is important to provide the entities involved in decision-making processes with the necessary information regarding sustainability. An indicative example of such methods, aiming to measure sustainability, are Sustainability Impact Assessment (SIA) techniques (Ness *et al*., 2007). Although these techniques have significantly increased in the past years there are certain challenges which make the measurement of sustainability highly complex: a) SIA methods often focus only on certain aspects of sustainability (Ness *et al*., 2007) with social indicators being the ones most frequently neglected; b) SIA techniques are dominated by top-down approaches where sustainability indicators measured are decided by policy makers and scientists with no or limited consultation of local stakeholders. This is an important issue taking into consideration that the participation and engagement of different entities is essential (Mickwitz & Melanen, 2009) especially when trying to determine the level of importance of indicators on a local level, c) sustainability indicators facilitate decision-makers in order to plan environmental policies (Wiek & Binder, 2005; La Lovere *et al*, 2010; O'Faircheallaigh, 2010). However, there are limited findings concerning how these sustainability indicators can be utilized in new decision-making techniques where collaboration of different entities (e.g. citizens, companies, NGOs) is essential (e.g. deliberation processes) (Petts & Leach, 2000). Thus, often there is no clear link on how sustainability indicator can feed into and be useful for policy-making.

In this paper we will focus on these challenges and we will propose a new methodological framework which aims to measure different aspects of sustainability taking into consideration the local context in which they are measured.

2. Proposing a new methodological framework

The methodological framework proposed here it is based on a combination of top-down and bottom up approaches. It is highly useful in cases where the aim is to measure sustainability on a local scale. The framework is divided in four stages.

Stage 1: Identifying local stakeholders and in-depth exploration of indicators

In the first stage, local stakeholders are consulted in order to identify the most important indicators according to their perceptions. By incorporating local stakeholders in this stage, specific local problems, referring to social, economic and environmental aspects, can be identified. Due to the very wide variety of indicators that can be discussed at this stage it is important that there is an initial mechanism to narrow down to some specific 'priority' indicators. This can be done by identifying the main categories of indicators which are most commonly measured in areas with similar environmental and socio-economic characteristics. In order to conduct the consultation process, there are a variety of techniques that a research team may use from the field of qualitative social research methods, with the most indicative example being focus groups. Through this stage the main indicators which need to be measured in the specific areas (because they are considered as most important by locals) will be identified. Additional indicators may be measured in the next stage if that is considered necessary by the research team.

Stage 2: Measurement of selected indicators

The final indicators selected should be divided in broad categories based on the aspect of sustainability they measure and also the method selected for their measurement. The research team may also decide to identify theoretical links between these indicators (both in the context of the same broad category of indicators but also between categories). At this point the methods in order to measure the selected indicators should be finalized. This should be conducted taking into consideration two main issues: a) the methods in the international literature and b) the comparability of the measurements, especially if one aim of the measurement is to explore links between indicators. For example, for certain social indicators data are often unavailable and researchers will have to conduct surveys in a specific population in order to collect primary data. After completing the measurement of the different indicators, the next challenging task is to combine them. Certain statistical techniques are very useful for this process such as Confirmatory Factor Analysis and path analysis which allow the combination of different indicators into aggregated measurements. A key task at this stage is to be able to measure different aspects of sustainability along with potential links between the different categories of indicators. For example, links may be identified between social aspects and environmental quality in the research area.

Stage 3: Exploring the importance of indicators for local communities and estimating weights

The aim of this stage is to quantify the importance of the selected indicators for the local community and incorporate this perception in the final estimations of sustainability. This is a very important stages of the proposed framework as it allows researchers to re-adjust the initial indicators measured taking into consideration the local context in which they are measured. This can be done by asking local stakeholders to evaluate the importance of the different indicators measured according to their perceptions. For instance, if three indicators of environmental pollution are measured (e.g. air quality, surface water quality and underground water quality), then the importance of these indicators for local communities can be measured through a question asking 'How important is good air quality/surface water/underground water quality for the sustainable development of your community?'). In case several indicators are used in order to measure one broad category of sustainability the level of importance for local stakeholders can be measured for one broad category. For example, if 5 indicators were used

in order to evaluate the level of surface water quality, then stakeholders' perceptions can be measured by asking one question 'How important is good surface water quality for the sustainable development of your community?' .The aim of these questions is to provide the research team with some 'weights' for the different categories of indicators, revealing the importance of each indicator for locals. When these weights have been defined then the sustainability indicators which were initially measured (stage 2) should be re-calculated taking into consideration the weights. Correlations between the new indicators should also be explored and a final estimation of sustainability at the research area could be estimated.

Stage 4: Using the results measurement in decision-making processes

In this final stage the results of the measurement should feed into decision making processes. The aim should be to use these measurements in order to: a) show the current situation in the research area regarding environmental and socio-economics issues, b) explore links (correlations) between different indicators and categories of sustainability (for example how environmental issues are linked with the socio-economic profile of the research area), c) highlight the importance of the different indicators for the local communities and d) make projections for the future by adjusting the level of sustainability indicators. The latter can be conducted through the use of simulation models in combination with the identification of correlations between the measured indicators. A statistical model can be developed for the specific research area where sustainability will be dependent on certain socio-economic and environmental factors (independent variables). By proposing certain hypotheses and changing the level of some of these variables, then the impact on other factors can be observed along with the impact on the final levels of sustainability. A significant contribution here is that the projection scenario will have already incorporated the importance of these indicators for the local population.

3. Conclusions

The methodological framework proposed here aims to address three main issues which are currently identified as challenges in the sustainability measurement literature. First, it incorporates local perceptions in the measurement of sustainability. Thus, it provides a combination of a top-down and bottom-up approach which is essential in order to achieve a more participatory measurement of sustainability. Secondly, the application of the framework assists in informed policy-making where local communities have been consulted during the measurement stage. Finally through the projection models and the comparison of the data from stages 2 and 3, the difference between the actual levels of sustainability and the 'perceived importance of sustainability' can become clearer allowing the use of the data for different stakeholder groups and increasing the involvement and engagement of these different groups in decision-making processes.

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