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## Discussing Features of Social Measures Important in SLCA Impact Indicators' Selection

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### Introduction

There have been several attempts to formalize Social Life Cycle Assessment (SLCA) methodology and make it as robust as the environmental part of Life Cycle Assessment (LCA). "Guidelines for SLCA of products" (UNEP/SETAC, 2009) and progressively "The Methodological Sheets for Sub-categories in SLCA" (UNEP/SETAC, 2013) have provided recommendations on how to conduct the first two phases of SLCA (i.e., goal and scope definition and life cycle inventory). The research on the third phase (life-cycle impact assessment) was, at that time, not considered sufficiently mature to be included (Sureau et al. 2017). With S-LCA conceived by the same practitioners who created LCA, it is not surprising that they attempted to model social impacts in the same way it was done for environment alone (Iofrida et al. 2017). Most of the applications take into account values, stakeholders' perceptions, subjectivities, and participation in an interpretivist way, but often without clarifying the theoretical underpinnings (Iofrida et al. 2017). In the following we attempt to clarify the role of these features of societal measures in the selection of the end-point social impact indicators in SLCA.

### Subjectivity

The construction of the subcategories and the related characterization models will inevitably include value judgments and assumptions (UNEP, 2009). It should be stressed that the way in which an instrument is implemented will lead to different results in terms of social impact (Rey-Valette & Cunningham, 2003). The SLCA guidelines (UNEP, 2009) recommend to cover at least the subcategories mentioned to prevent using S-LCA results on a few limited topics for social marketing aims while not addressing core issues. Nonetheless, concerning UNEP/SETAC (2009, 2013) 31 sub categories of assessment, for general applicability, require large amounts of data which are not always available, and there is a large influence of the subjectivity of the individual researcher (Blom and Solmar 2009; van Haaster et al. 2017).

Environmental LCA uses quantitative and comparable indicators to provide a simple representation of the environmental impacts from the product life cycle. This poses a challenge to the social LCA framework because due to their complexity, many social impacts are difficult to capture in a meaningful way using traditional quantitative

single-criterion indicators (Dreyer et al. 2010). Consensus on a single end-point SLCA measure would not be finalized unless its goal is well defined. Researchers agree on the goal of SLCA on that to assess the social impacts of products along their life cycle. However, the variables that are to be considered as social is yet to be agreed upon.

### ***Diversity of Social Values***

Contextual values are moral, personal, social, political and cultural values such as pleasure, justice and equality, conservation of the natural environment and diversity. In most views, the objectivity and authority of science is not threatened by epistemic, but only by contextual (non-cognitive) values (Reiss and Sprenger 2017). Social facets are more influenced by context than environmental or economic ones (Sierra et al. 2017). Social aspects can be highly diverse and are weighted very differently by different interest groups and in different countries and regions (Grießhammer et al. 2006). Therefore, the social (and socio-economic) impacts to be covered in an assessment and the way this should be done should be case and context specific (UNEP, 2009).

Ethical issues such as justice, equity and dignity are subject to the society where they are discussed, i.e. what is considered right in a certain society might not be the case in another. Therefore, claiming the rightfulness of a society's (working, living, institutional) conditions based on other societal values would be invalid. One might say that the international organizations' agreements are one good indication of social values that have to be respected by all the member countries. These values are however, normative ideals that are projected to become universal. Some societies might be far from the agreements signed by their countries' representatives. On the other hand, the absence of one quality should not be translated as a weakness since other qualities, not considered in the assessment (i.e. family ties, traditional mechanisms of social support, ...), may compensate them. The social indicators should have a universal character, no matter where it's used, they would have the same sense.

### ***Aggregation of data***

It is mentioned in the guidelines (UNEP, 2009) that "the action of summing or bringing together information (e.g. data, indicator results, etc.) from smaller units into a larger unit (e.g., from inventory indicator to subcategory) in S-LCA may be done at the life cycle inventory or impact assessment phase of the study and should not be done in a way that leads to loss of information about the location of the unit processes". Modeling or aggregating the results of the subcategories in order to present one result in terms of well-being has been proposed by Dreyer (2005) and Weidema (2006). While thinking about aggregating indicators we have to consider the fundamental principle that objective and subjective dimensions are separate entities that normally bear little or no relationship to one another, and so must be separately measured (International Wellbeing Group, 2013). The SLCA subcategories, which have been mainly inspired by ISO 26000 (2010), are not of one single nature.

The change in the social indicators should neither be considered negative nor positive. The value of the change is relative to the future plans of the region, and whether the change complies with that plan or not makes it positive or negative. If we don't know the sense of the effect, adding the data together would give a result without any sense. Unlike the natural scientist, the social scientist is not interested in the common or average aspects of the facts under consideration; rather the social scientist is interested in their characteristic traits, their cultural significance, and their meaningful interrelationships as defined by the problem in hand (Hekman, 1983). Furthermore, the statistical feature of social indicators of sustainable development is to reflect the detail of distributions under different arrangements and not average or modal situations (Antoine, 1999 in Rey-Valette & Cunningham, 2003).

Analyzing each single indicator independently can be a solution to avoid the aggregation problem. Either a comparison of the indicator is carried out between two alternatives or the situation, the case study is studied before and after the change. Another solution can be simply limiting the assessment to a single end point indicator. Endpoint indicators have the advantage that they can reflect the potential damage or benefit to the Area of Protection, having the advantage, in theory, that no subjective weighting is needed (Jorgensen et al., 2008).

### **Rebound effect**

The social domain is complex due to the existence of strong interactions between factors leading to multiplier effects (Rey-Valette & Cunningham, 2003). Sierra et al. (2017) outlined that social sustainability assessment has two aspects: 1) the social contribution in terms of how interventions interact with its context and 2) the potential benefit distribution effects on a long-term basis balanced with its short-term contributions. The impact of a single technology at the macro level is generally small, but could potentially be large (Hasster et al., 2017). Each change in the production cycle may have its particular effect on the society and each effect, in turn, may create its own consequences (e.g. change in socio-cultural relations). This stems from the fact that every product is accompanied by particular production-consumption culture. Therefore, apart from the main cycle of the product which is analyzed, their rebound effects have to be considered as well. Weidema (2008) defined rebound effects for production and consumption changes, as derived changes in production and consumption when the implementation of an improvement option liberates or binds a scarce production or consumption factor (money, time, space and technology).

The amplitude of a single change's rebound effects may vary in different time periods for the same society as they may become resistant to certain conditions, adopting strategies which allow them to receive the change more pacifically. Resilience, the ability to absorb the external changes, depends on the capacity of the society to undergo or adapt to change. Therefore, the results of assessment can be expected to be different according to the time of its realization. The assessment carried out after the adaptation process would result in a more stable situation. End-point (or even

midpoint) indicators may be able to capture a great deal of the effects created by the change in the system.

### **Conclusions and future developments:**

The search for universal objective social impact indicators continues in SLCA. Diversity of societal norms in different countries and researchers' point of view (from different disciplines) have prolonged the consensus. The end-point social impact indicator should be able to capture the social effects created in long-term, covering the rebound effects and the range of affecting factors. In this process we should not forget the difference between the natural sciences and social sciences in the sense that social issues are influenced much more by the subjectivity of researchers and the social context of the impacted population.

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